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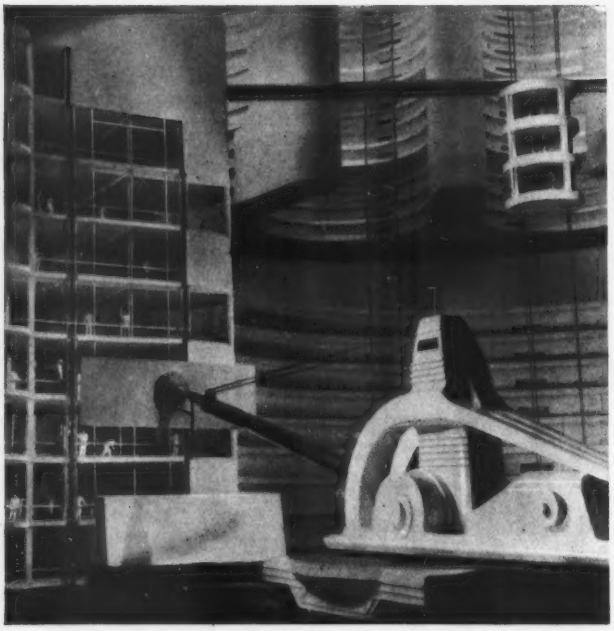

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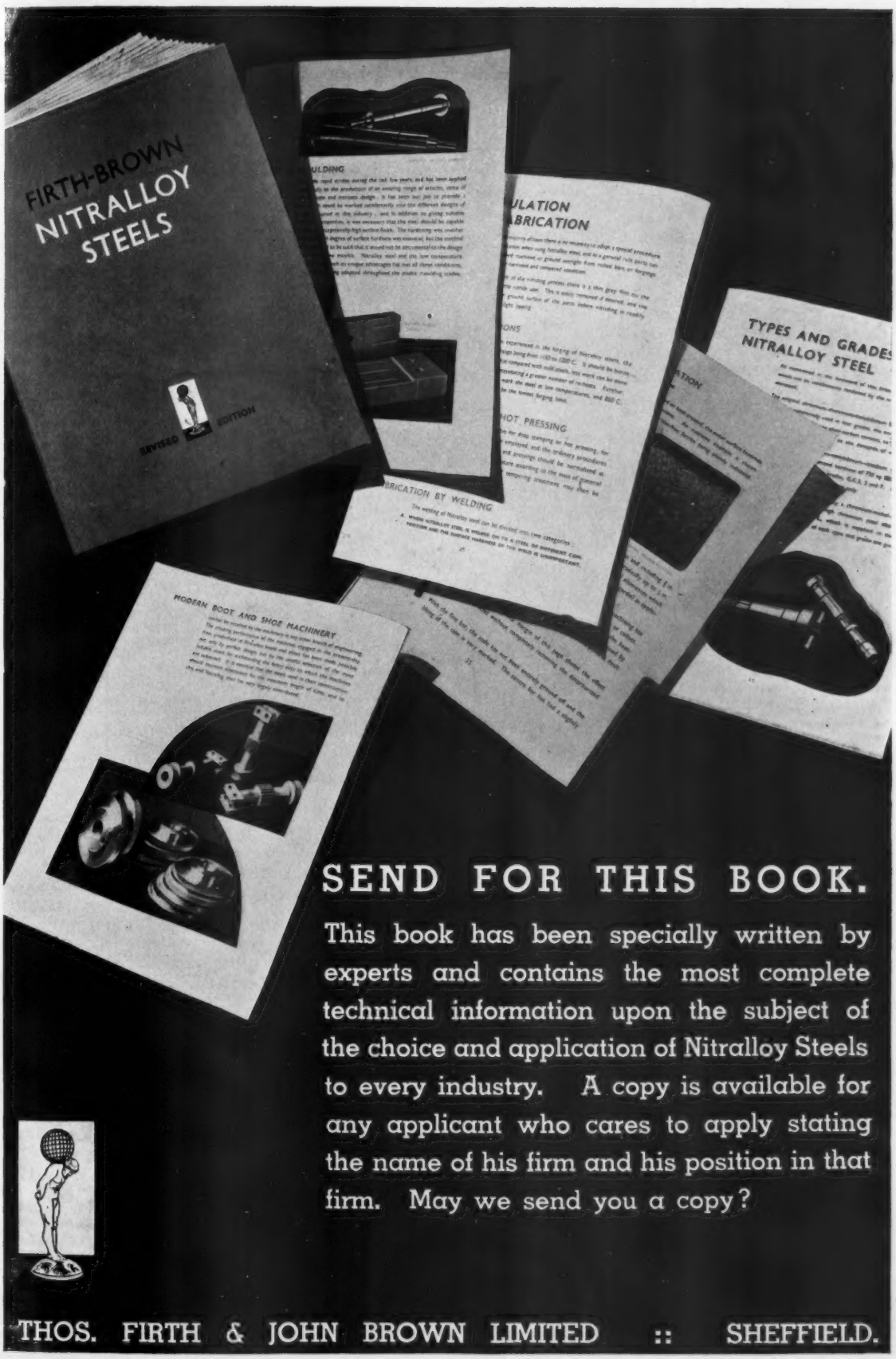
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Continued on page vi

5. THROUGH LIFE WITH BX PLASTICS

Peter and Prudence were married in the autumn and the first winter has simply flown. They threw quite a number of parties for old friends and new, and many a Table Tennis Ball came to an untimely end. ("You know how the things get trodden on" says Mr. Punch.) Elderly and more sedate visitors seemed to prefer Bridge, and BX plastics again played a part as markers, scoring pads, and even playing cards.

1 Table tennis balls, darts, Christmas card and playing cards.

Easter—and the first holiday! The car is overhauled and given a thorough spring-cleaning. How well the Xylonite and Bexoid parts come up when they're polished! And Prudence, with thoughts of bright days and tennis, buys a Bexoid eye shade, while Peter invests in a pair of tinted sun spectacles with Bexoid frames (he generally manages to lose five pairs every summer, but they cost so little it doesn't matter!).

2 Glare shade, golf tees, golf club face and shaft covering, fly box, sun spectacles.

Plastics for holidays—you can't get away from them! Peter and Prudence found that out. It started with buying a couple of attractive yet inexpensive fountain pens that wouldn't be too deeply regretted if they got left on the beach, continued with a set of motor maps safely protected from rain spots and finger marks behind Xylonite, branched out in new directions with some buckles and dress ornaments that Prudence no sooner saw than had to buy, and reached its climax when, at a certain famous seaside place, they discovered that the show piece of the local scheme of illuminations was a lighthouse—30 feet high and made entirely of Armourbex (wire-reinforced Bexoid)!

3 Armourbex lighthouse.

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Full information on any branch of Plastic Production may be had from the Company's Head Office: Hale End, London, E.4.

THE BRITISH XYLONITE COMPANY LTD., HALE END, LONDON, E.4 & BRANTHAM

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DIRECTORY OF THE INDUSTRY

CONTINUED FROM PAGE iv.

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You remember that old story about the art dealer. He had in his window an unframed picture priced at a guinea. It was a good picture, but nobody was interested in it, and it stayed there for months. Then the art dealer had an idea; he took a frame costing ten shillings, put the picture in it and altered the price ticket to five guineas. He sold the picture the same afternoon.

This is an old story, but the moral of it still applies. No matter how attractive your product is, it can be made to look and sell even better with the right kind of pack—a pack moulded in Scarab or Beetle.

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Packing

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Plastics

Dealing with the Manufacture, Uses and Potentialities of Plastic Materials.

Vol. II. AUGUST, 1938 No. 15

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Proprietors, Printers and Publishers of "The Motor," "The Light Car," "The Commercial Motor," "Motor Cycling," "Cycling," "The Motor Ship," "The Motor Boat," "The Oil Engine" "The Aeroplane," "Light Metals," and "Chain & Multiple Store."
5-17, Rosebery Avenue, London, E.C.1

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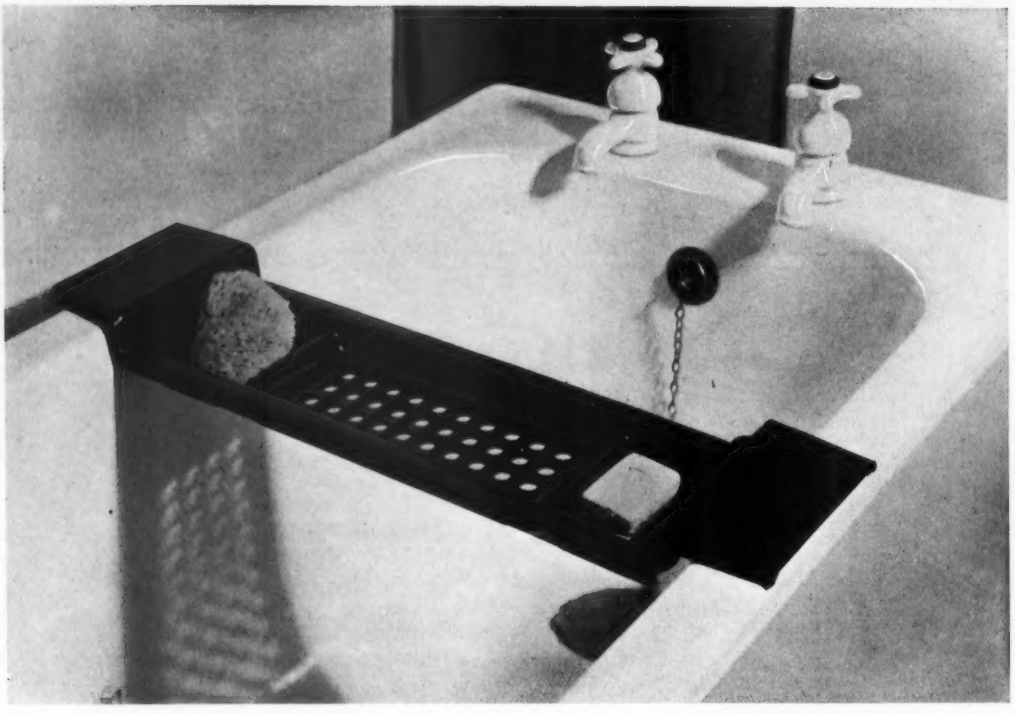

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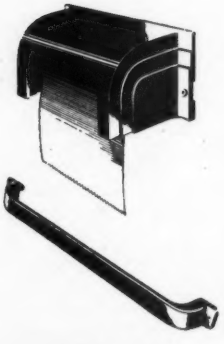
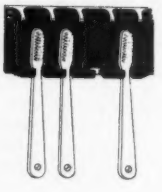


The toothbrush rack, towel rail, soap and sponge holder illustrated are outstanding examples of but a few of the articles now produced from BAKELITE Moulding Materials for the modern bathroom and lavatory. These articles are moulded by Messrs. H. E. Ashdown (B'ham) Ltd. for Messrs. O. C. Hawkes Ltd.



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THE MATERIAL OF INFINITE USES

Vol. II. No. 15 AUGUST, 1938

Plastics

Dealing with the Manufacture, Uses and Potentialities of Plastic Materials

Proprietors - - TEMPLE PRESS LIMITED
Managing Director - ROLAND E. DANGERFIELD

Editor - - M. D. CURWEN, B.Sc., A.I.C.
Offices - 5-17, Rosebery Avenue, London, E.C.1

DEAD AS A DOOR NAIL

STRONG rumour has it that a factory is in process of being erected or has already been erected in Manchester for the sole purpose of making coffins from plastics—indeed, moulded coffins from phenol-formaldehyde resins. We do not know whether this rumour is a product of the present silly season, and contemporaneous with new summer stories of the Loch Ness monster, but the idea is by no means new, and, we believe, has already been carried out in practice in the United States of America, where undertakers are not of lowly state, but enter into high social spheres under the name of morticians, funeral directors and so on.

We have moved far in our march of civilization. A hole in the ground with no covering for the brute savage, a stone sarcophagus for the Egyptian King, a sack and over into the Bosphorus for the Sultan's enemy, the elm coffin and the polished brass handles for the Victorian, and a $10,000 silver box for the Chicago gangster.

To-day the mere hole in the ground is considered too damp and unfriendly, the stone sarcophagus too large and too heavy for transport, the sack too easy to escape from (we've just seen the film "The Count of Monte Cristo"), the wooden coffin too liable to insect attack, and the silver one too ostentatious for normal production in this country.

And so, since we are in the Plastics Age, a great deal is to be said for moulded containers. Let us make no mistake about it, the burying industry is large enough to make manufacture a mass-production affair, even though the press to make a good six-footer would have to be a large one. Some 500,000 die every year in this country alone.

The chief argument put forward in favour of the plastic coffin is one of permanence and freedom from attack by bacteria and fungi always present in moist earth. All woods which absorb water readily are attacked, and disintegrate more or less rapidly, whereas the complete absence of cellulose and similar bacterial foods in the phenol-formaldehyde type of resin, and its high resistance to water, which is essential to bacterial and fungal growth, make plastics of this type ideal for coffin construction.

It must be remembered also that in many countries insect attack is much greater and more rapid than in this country, and wooden structures may disappear almost entirely in the space of a few months if not properly protected. This applies especially to districts infested with white ants, such as America, Africa and India. Here the problem of making a lasting coffin is of extreme importance.

Moulded coffins are, of course, not the only possibility; indeed it would seem simpler at present to construct them of laminated material to produce similar results. There is also yet a third method which has already been applied in practice. Last month we received a visit from Mr. Lithgow, of the Lithgow Corporation of Chicago, who has developed the lining of metal and other vessels with a special type of phenolic resin, so that they may be rendered acid proof and suitable for containing food products. We published some notes regarding this process in our September, 1937, issue. Mr. Lithgow informs us that his process has also been applied to the interior and exterior treatment of coffins in America with excellent results.

Railway Carriages Again

IN our July issue we discussed the possible value of constructing railway carriages of plastic materials as an alternative to steel and wood. It will be remembered that experts are divided in their opinion as to the suitability of these two materials of construction, owing to the danger involved during collisions. The steel is too rigid, and therefore liable to produce great shock, while the wood is liable to splinter, and therefore to produce another type of injury. Our suggestion to employ resin-impregnated wood or laminated plastics was rather a shot in the dark without real knowledge of its practicability. It seemed, however, a reasonable suggestion backed by experience in other uses.

In the past month we have been greatly cheered by a visit from a Frenchman, who represents a Continental concern producing a laminated material bonded with

resin, and known by the trade name of Durisol. He informed us that certain railway authorities were employing this material for the construction of carriages and that it was considered an important step forward in safety measures.

We have been fortunate in obtaining some publicity on this subject—in the *Daily Telegraph*, which recently published a letter from the Editor of this journal, and also in the *Investors' Review*, which discussed our editorial. We trust that our railway companies will follow in the steps of the French authorities and at least test the claims made for laminated plastics.

Plastics and Road Making

FOR some years past the rubber industry has concerned itself in investigating the use of rubber for roads, and in London Town itself several stretches, usually in the form of blocks, have been laid down with varying success. Two stretches we have had under observation ourselves, one in Baker Street and the other in a narrow street in the heart of the City, appear to have stood up so far very satisfactorily. The sound-deadening properties are excellent, and since modern rubber has such good wearing and ageing properties there should be considerable scope for this material; at least, in special areas where cost is not the first consideration. It is probable that rubber roads would last much longer in this country than in many others, because of the comparative absence of strong sunlight. We remember that at Monte Carlo some few years ago a rubber "beach" was laid down on the seashore, but was discarded owing to rapid deterioration. This was probably due to the effect of the strong sun, combined with that of ozone.

At a meeting in Ottawa recently Sir Gilbert Morgan, of the Chemical Research Laboratory in Teddington, related that on behalf of the Rubber Growers Association an investigation had been carried out on the incorporation of rubber and rubber derivatives in road tar, with a view to improving its properties as a surfacing material. The most interesting results have been obtained by blending chlorinated rubber with tar, whereby materials of greatly increased elasticity and strength are produced. This incorporation is carried out by mixing the constituents at steam temperature for about two hours.

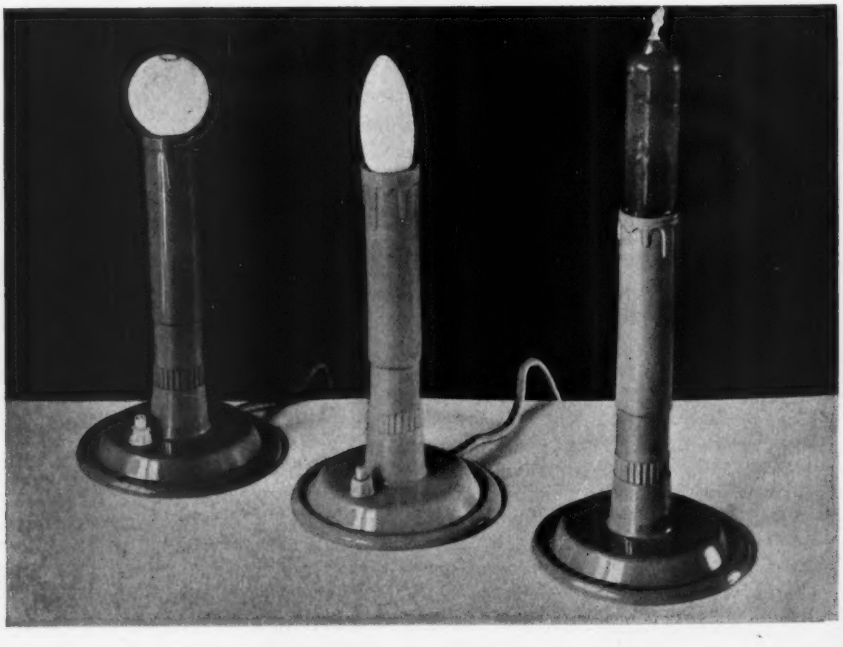
Preliminary tests on the wetting and binding properties of these new products have yielded encouraging results. The investigation on the physical characteristics of chlorinated rubber-tar blends is being continued on a larger scale, that is, under practical conditions, at the Road Research Laboratory, Harmondsworth.

Synthetic resins have, as far as we know, never been used practically for making road surfaces, although mixtures of sand and air-hardening resins, or materials containing them, have been suggested. One such suggestion also advocated the inclusion of materials such as barium sulphide and other luminous compounds in order that the road should be self-illuminating. We can scarcely advocate such a process, since there is little doubt that dirt would soon mask or destroy this property.

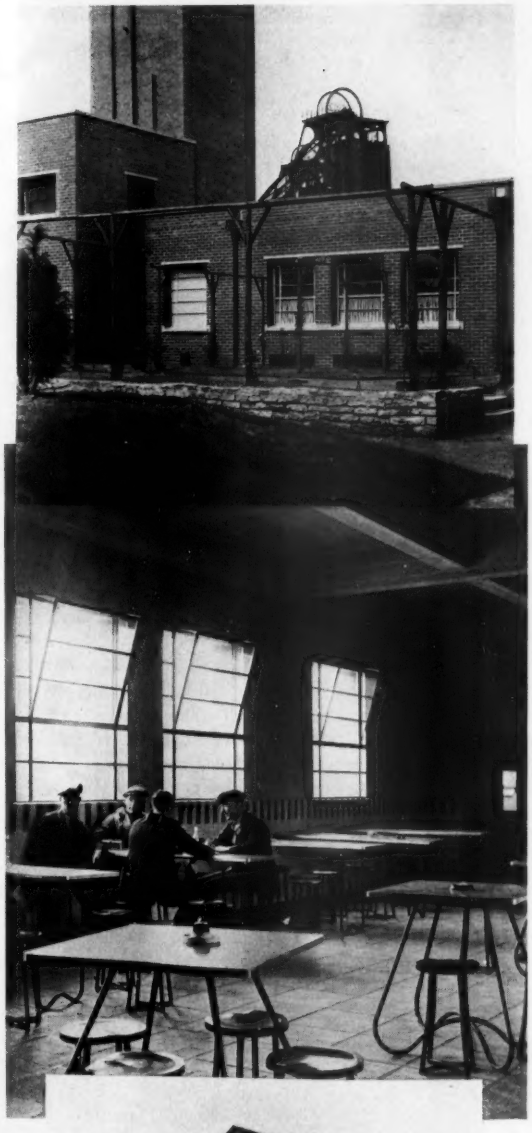
Hawkes Coat and Hat Hook

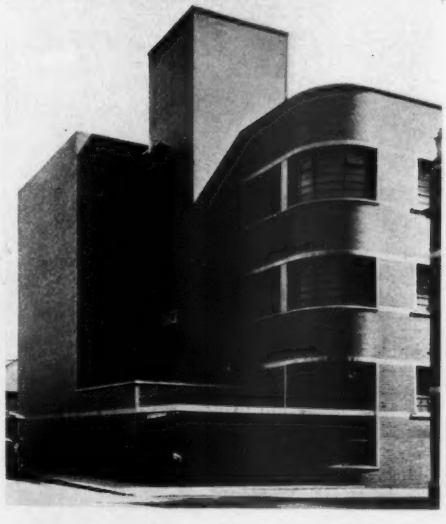
We have received the information from O. C. Hawkes, Ltd., that the coat-hook we described in our last issue was designed by Mr. Naum Gabo, the well-known sculptor. This artist will be remembered for the interesting designs in transparent plastics we described in our February, 1938, issue, under the title "Constructions in Space."

SOFT LIGHTS ON HUNGARIAN MOULDINGS



Three attractive examples of electric "candle-sticks" made in Hungary from Futurit, by the Kabelgyar R-T., Budapest.





(Top) Pithead baths at Sherwood Colliery, Mansfield.
(Centre) Cafe adjoining pithead baths at Sherwood Colliery.
(Bottom) Exterior of Bestwood pithead baths, Notts.

£625,000 for PITHEAD BATHS

Should be good news to the Plastic Industry

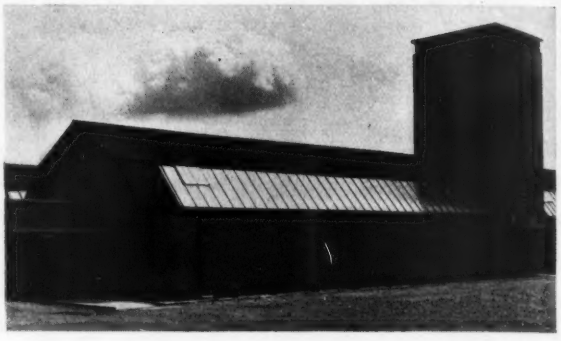
THOSE who are continually belittling our social services and holding them up to odious comparison with those on the Continent and in America, should visit some of the pithead baths in Yorkshire and the Midlands. We recommend the installation at Sherwood Colliery, Mansfield, Derbyshire, as a particularly fine example of the excellent work now being done by the Miners' Welfare Committee. Apart from well-equipped washing facilities for the miners coming off their shift, there is a large swimming bath and a pleasantly designed café where tea and soft drinks may be obtained.

At one time, and that not long ago, pithead baths were unpopular with both owners and men. The former regarded them as unnecessary and the latter with an uneasy suspicion that they represented a sop to labour and were not likely to be of permanent benefit to the industry. Happily this unfavourable attitude has given way to an enthusiastic welcome, and to-day the Miners' Welfare Fund is receiving more applications for pithead baths than it can grant, notwithstanding the greatly accelerated building expansion sanctioned in 1937 and 1938. The baths completed and under construction provide accommodation for more than 381,000 men and women and the total sum provided by the fund for pithead baths to the end of December, 1937, was £4,906,028.

Last year contracts were placed by the Central Committee of the Miners' Welfare Fund to the value of £657,600, and at the end of the year building or preparations for building were in progress for 152 new baths to accommodate 170,000 men and women at a cost of £2,500,000. Last March arrangements were made with the Secretary for Mines to continue the building programme on the expanded basis of £625,000 a year until 1944, when it is believed that adequate provisions will be made for baths except at very small collieries.

This extensive constructional programme is acting as a very welcome stimulus to the building trade, but so far the plastics industry has not shared in the work, except as regards electrical fittings moulded of phenol and amino resin. This neglect of plastics should be rectified immediately and the excellent qualities of many of the materials of our industry brought to the knowledge of official architects responsible for the schemes and the specification of materials to be used. In America, a large number of industrial cafeterias have now been equipped with plastic laminated table tops because stringent practical and laboratory tests have shown them to possess high durability and resistance to conditions that commonly cause deterioration. They possess many advantages over competitive

materials as they are blister-proof and completely unaffected by hot liquids, alcohol or, indeed, any other fluid or solid likely to be found in an employees' restaurant. Not only is laminated sheeting, such as can be obtained from Bakelite, Ltd., Metro-Vickers, Ltd., Roanoid, Ltd., and several other well-known firms ideal for table tops, bar counters, etc., but it can be wholeheartedly recommended for wall panelling as its surface is hygienic, and besides being impervious to deterioration by normal means, does not attract dust and can, therefore, be kept spotlessly clean with the minimum of attention. A large number of colours are available in various surface finishes, varying from satin to morocco, and inlays of simple designs may also be made in laminated sheeting. Apart from wall panelling, the material can also be used for doors of the flush type with smooth, even surfaces, revolving doors, elevator doors, as well as kick plates and window stools, etc. It might also be mentioned that moulded door furniture, preferably metal reinforced for heavy use, is well fitted for use in pithead baths as they are maintenance free and never require any attention.



Exterior of Newstead Colliery pithead baths, Newstead, Notts.

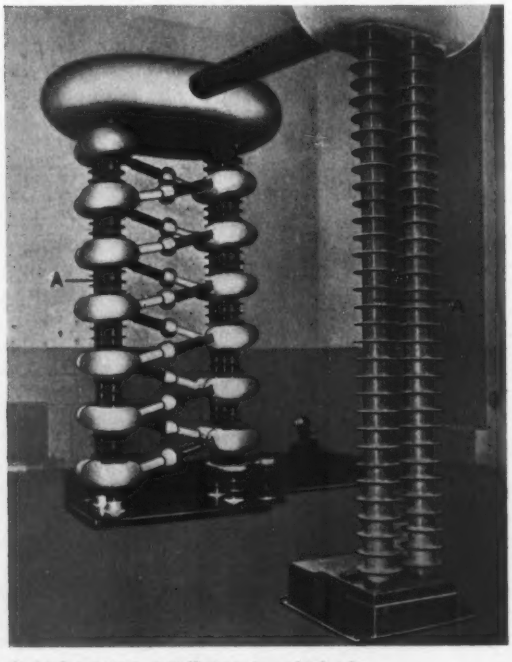
N. V. Philips's New Plastic

ON the Continent, particularly in Germany, considerable use is being made in the electrical and heavy engineering industries of "Philite," the synthetic resin compound made by N. V. Philips's Gloeilampenfabrieken, Eindhoven, Holland, and in the January issue of *Philips Technical Review* some interesting information is given by L. L. C. Polis regarding its use as a structural material.

It is stated that, unlike many synthetic resins, "Philite" does not get thin and fluid in the press, but remains a tough, plastic mass. The shape must, therefore, be chosen so that the mass need not flow around sharp corners, but pass easily from one portion of the mould to the other by streamlining as far as practicable the actual design of the tool.

"Philite" is a poor heat conductor, so that the thickness of the material has a very great influence on the time necessary for the material to harden in the heated mould. The material at the core must also be subjected to the high temperature for a sufficiently long time in order to complete the hardening process. This longer time for pressing is, of course, a factor in the cost price. Normal thicknesses of walls are from 3 mm. to 6 mm., 10 mm. being the maximum.

Regarding new applications of "Philite," it is being extensively used in Germany for bushes, and the first success with bushes made of synthetic resin was achieved in steel rolling mills in Germany, where they were used for slowly turning shafts with shaft pressures of 200 kg./cm.^{2} Where "Philite" is used for bushes a temperature higher than 80 degrees C. in the bearing must be regarded as the limit and efficient lubrication has to be effected. The material also possesses excellent insulating properties and finds many new uses.



A high-tension installation in which the columns (A) are composed of Philite elements shown on the right.

A close-up of one of the Philite electrical insulating units used to make up the high-tension installation.

SILVER and PLASTICS

How the modern designer is using these two materials to obtain beautiful as well as really functional tableware and dressing-table accessories

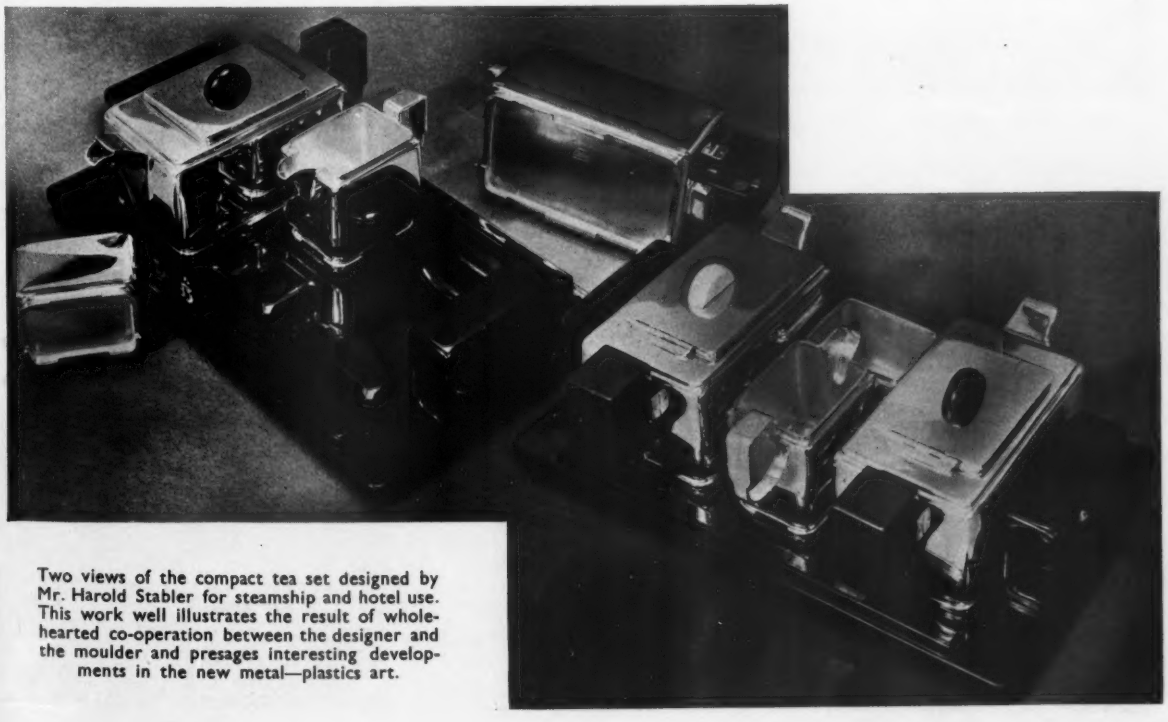
THE recent Exhibition of Modern Silverwork held at the Goldsmiths Hall showed that silver harmonizes perfectly with both moulded and cast resins, and effectively proved that well-designed combinations of the noble metal and plastics can be of outstanding beauty as well as utility.

Whilst the majority of the designers evidently preferred ivory, onyx and wood to plastics, in practically every case equally effective and certainly more colourful results could have been obtained by the use of such materials as phenol formaldehyde and amino resins for tea-pot and jug handles, or cast resins and Erinoid for the knobs of lids and ornamental parts on church silverware.

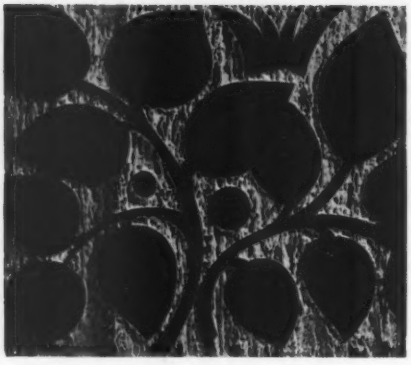
The outstanding example of the wise combination of silver and plastics was the work of Mr. Harold Stabler, the well-known designer for the glass, pottery and other industries besides silver. He chose a phenol formaldehyde resin for the ingeniously designed tray made to fit his compact silver tea set. The tray was moulded in three parts: the base with certain portions in relief to fit the specially recessed silver tea-pots, one for China and another for Indian tea, milk jug and sugar bowl; and two high-set handles which screwed in to the base of the tray. The word functional is so misused that one is rather hesitant about using it, but it certainly does describe more adequately than any other adjective this particular tea set designed by Mr. Stabler primarily for hotel and steamship use.

In conversation with a well-known designer at the Exhibition, it was pointed out that whilst it is recognized by silversmiths that plastics such as Bakelite are ideal for the handles and knobs of mass production lines, they cannot obviously be used by designers or craftsmen for individual work where, perhaps, only two or three examples of the design would be made. There is, however, a tendency on the part of contemporary designers to test the merits of the cast resins, such as Catalin, which can, of course, be carved in exactly the same way as ivory. Erinoid and Lactoid may also be dealt with on similar lines. These materials place in the hands of the craftsman a new medium for the expression of modern ideas and by making available a wide range of colours and textures they tend to enhance the beauty of modern silverware.

Never before in the 600 years of its history under Royal Charter has the Worshipful Company of Goldsmiths organized such a comprehensive exhibition and none of the exhibits was more than 20 years old. Encouraged by the excellent reception given to this bold experiment, it is to be hoped that the company will organize a similar exhibition next year, and then plastics must really give a better account of themselves and not be content to remain unmentioned either on the labels of exhibits or in the catalogue. It is, of course, impossible to break down that deep-rooted suspicion of all things new which, unfortunately, exists in old industries, but we look to the Worshipful Company of Goldsmiths to give plastics a fair trial and our industry at least some encouragement.



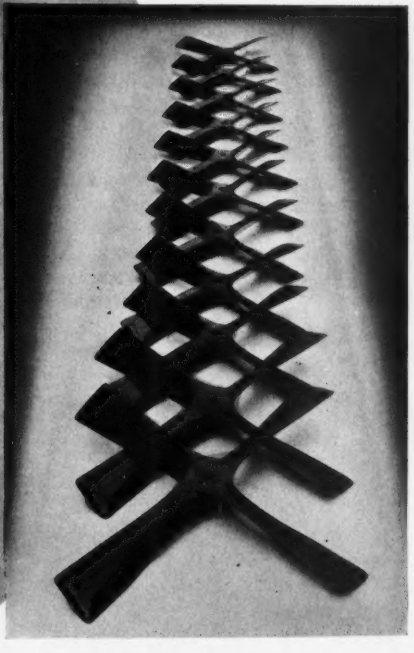
Two views of the compact tea set designed by Mr. Harold Stabler for steamship and hotel use. This work well illustrates the result of wholehearted co-operation between the designer and the moulder and presages interesting developments in the new metal—plastics art.



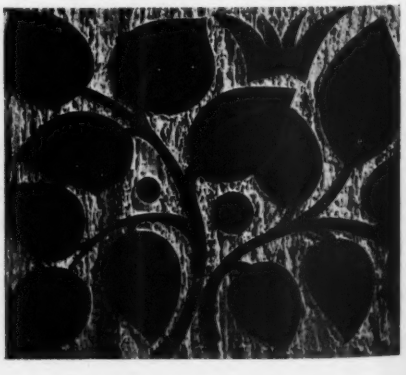
A carved panel of specially treated Durisol which shows the versatility of this well-known French product. Panels similar to the above are now finding many uses on the Continent.

This new L.P.T.B. tube train suggests a promising field for impregnated wood flooring.

Impregnated wood panelling is suggested for radium treatment rooms in modern hospitals.



Industrial fans made of Jicwood. Bottom left is an L.P.T.B. escalator which in the future may possibly be made of impregnated wood.



IMPROVING UPON NATURE

by Compression of Wood and Impregnation with Synthetic Resins

IN spite of formidable competition from the ferrous and non-ferrous metals, as well as plastics, wood is still the most important constructional material available to modern industry. Whilst acknowledging the many excellent qualities of wood, it must be admitted that wood has serious defects which, until the present time, have limited its application, particularly in the engineering field, where high mechanical strength, freedom from corrosion and abrasion and low water absorption are essential. Wood in its natural form is rather an unstable substance and easily affected by changes in temperature and humidity; moreover, it lacks true uniformity of structure and is readily attacked by insects and fungi.

For some years now chemists and engineers have been trying to improve on Nature by transforming wood into a material approaching the strength and stability of the metals, yet without their heaviness, and the high insulating properties of rubber without its elasticity. It is realized to-day that these attempts have been most successful and wood is finding its rightful place as a material of great strength and with a thousand potential applications.

Two of the most interesting processes of improving wood are by compression and impregnation. The first consists of subjecting a number of glued laminations to enormous pressure, so as to obtain a sheet material harder than any wood grown and with a uniform structure throughout. This process is only of academic interest to the plastic industry, although it is interesting to note that synthetic-resin glues are being used for sticking together the veneers of birch and other wood. The second method consists of impregnating the specially conditioned laminations with a phenol-formaldehyde resin dissolved in alcohol and then pressing them together in huge hydraulic presses to form a solid piece of wood-like material of the desired thickness. The outstanding difference between compressed wood and impregnated wood is that the latter although heavier than the compressed variety, has a much lower water-absorption figure and therefore finds many new applications.

In Germany and France work on improving natural wood so that it can replace the valuable non-ferrous metals has been encouraged by the Governments, who have been quick to realize that in the event of war it would be a great national asset to possess a really sound substitute for metals. As a result of this far-sighted policy, which this country might well have followed, the new forms of wood have played, and are still playing, a vital part in rearmament plans. In France great progress has been made with impregnated wood and the Société des Etablissements Cadoux of Beauchamp, one of the largest carriage-wagon manufacturers on the Continent, have for some years been using their own impregnated wood, known as Durisol, for carriage floors and sides, also for lift floors, escalators, etc., and comparatively recently their material has found many other important applications, both in the aircraft industry for airscrews and spars and in the engineering industry for a large number of mechanical and insulating parts.

Durisol is composed of hardened beech plywood sheets impregnated with a special phenol-formaldehyde resin and pressed together in powerful hydraulic presses. The position of the fibres in the finished material influences its properties to a considerable degree, and Durisol is obtainable in three different forms, all of which, however, have the same density, which is 1.4. The first quality is made up of sheets with parallel fibres and, therefore, resembles wood. It is particularly suitable for all uses requiring a great resistance to traction and flexion, and is well adapted for the manufacture of pieces of great resistance for electrical work, such as insulating fish-plates for railway tracks, as well as accessories for textiles, various kinds of flooring, gear wheels, etc. The second quality consists of impregnated layers assembled by crossing the fibres at 90 degrees, which mean that the resistances are compensated in four directions, and in consequence the material has a greater resistance to compression and shearing than the first grade. Friction rollers, pulleys and bearings for heavy loads are now being made out of this form of Durisol. The third quality consists of successive layers placed with their fibres crossing at 45 degrees, so that the resistance is practically the same in all directions situated in the plane of the sheets. This is the very best material for the manufacture of rollers and noiseless gearing of many different kinds.

Durisol is available in the form of boards up to 1.75 metres (5 ft. 9 ins.) in length, 0.42 metre (16½ ins.) width, and in all thicknesses varying from ½ cm. to 250 mm. (.2 in. to 10 ins.). It can be worked like hardwood on woodworking machines, or like soft steel with ordinary high-speed tools, and units made of Durisol can be assembled with rivets, wood or metal screws or a strong cold glue, but they cannot be nailed.

Warehouse at the Weybridge works of Jicwood, Ltd., where birch veneers of many different thicknesses and qualities are stored ready for compression and impregnating.

The use of impregnated wood in railway construction and shipbuilding is of considerable importance, and in France it is realized that this new improved form of non-splintering wood is of great value, not only from a mechanical standpoint but also as regards safety. It is, therefore, admirably fitted for many constructional purposes in carriage and commercial-vehicle manufacture. The future appears to be very bright for Durisol, especially as the present arms race in Europe is responsible for a shortage of metals.

Not only are sheets available consisting entirely of impregnated layers, but also of just one or two impregnated laminations pressed down on to layers of untreated wood. Panels of solid wood are also made with a thin surface layer impregnated, and these, when hand carved to give relief effects, can be very attractive and suitable for wall-panelling. The insulating properties of Durisol are exceedingly important and encourage many new and interesting applications, one of these being the use of sheets containing a central thin diaphragm of lead for radium-therapy rooms in modern hospitals. The impregnated wood, plus the lead, acts as an effective barrier against harmful radium emanations and takes the place of a very thick sheet of lead.

Although great strides have been made abroad with compressed and impregnated wood, this country has, perhaps, more than any other, kept abreast in its investigations, and realizes the potentialities of an improved form of wood. In *Plastics* of October last a short description was given of the work then carried out on the Jic process by Halila, Ltd., of Slough, and the article excited considerable interest as it was quickly realized that this company would soon turn out a form of resin-impregnated wood as good as, and even better than, most types made abroad.

Since that time Halila, Ltd., has consolidated its position considerably and, in conjunction with the Airscrew Co., a subsidiary has been formed under the name of Jicwood, Ltd. Plant for the production of hardwood by the Samsonow process and for impregnated wood has been erected within the Airscrew Co.'s factory. Whereas at Slough the process was still in an experimental stage, to-day it can be said that the product manufactured at Weybridge on a mass-production basis is far superior to anything yet achieved in this country or abroad.

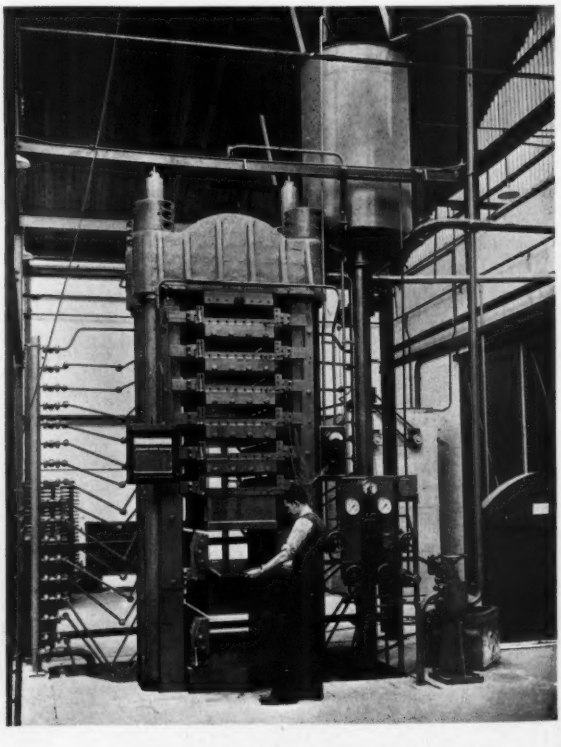
The hardwood material has been generally accepted and is used very successfully in the root of detachable blades. The latest figures which have been consistently obtained at Weybridge, in the laboratories of the Airscrew Co., give the following properties:—

Tensile, 47,800 lb. per sq. in.
Shear, 7,400 lb. per sq. in. (along grain).
Compression, 26,500 lb. per sq. in.
Density, 85.6 lb./ft^3.
Modulus of elasticity, 4-4.5 × 10^6.
Impact—Izod, 13.6.

Research is being continued on less dense material suitable for spars. Great progress has been made, and it is anticipated that very soon the research on these lines will be concluded. It is significant that such a well-known firm as the Airscrew Co. should take such an active interest in these improved forms of wood, and the obvious explanation is that they realize their immense future, not only for the immediate purpose in the airscrew industry, but in many other fields.

The Weybridge plant is well equipped with an excellent inspection and testing branch, which ensures that the process adopted will yield a fully tested and approved product before it is put on the market.

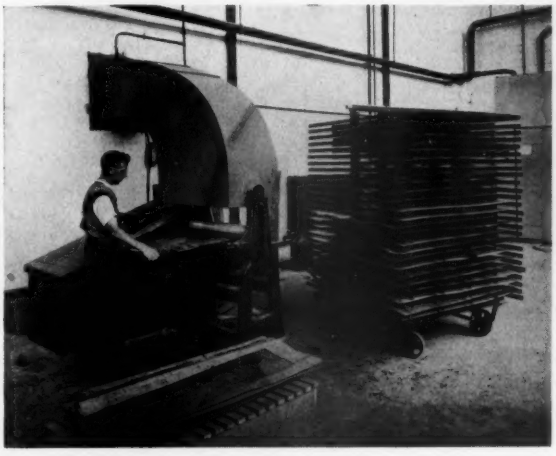
The kiln where veneers are conditioned ready for impregnating. The conditioning is done very carefully by experts so as to ensure uniformity of product.



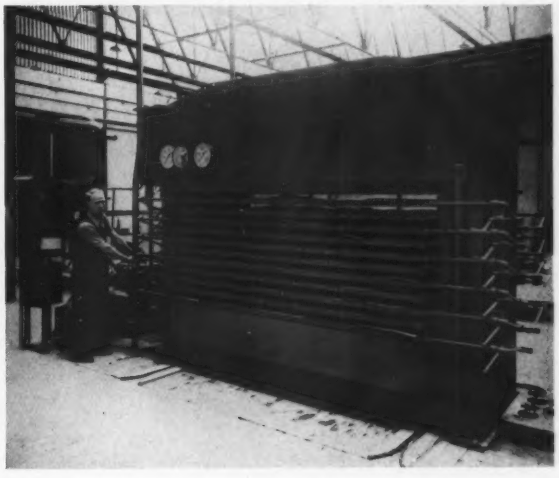
This large eight "daylight" press is used for compressing impregnated veneers. Normal working pressure is 3,000 lb. per sq. in., and it produces material 51 ins. x 25½ ins. up to 3 ins. thick.

Anyone who has followed, step by step, the developments in this fascinating new branch of the plastics industry cannot but be enthusiastic regarding the future of this improved form of wood. Where lightness, coupled with excellent mechanical properties and stability, is desired, then compressed wood is indicated, but where a heavier material, although still lighter than metal and endowed with great resistance to corrosion and abrasion as well as low water absorption properties is needed, then an impregnated hardwood is required.

Complete compression of normal wood with a density of 86 lb./ft³ will give a maximum specific strength, and no improved characteristics, either mechanical or physical, are to be expected from any form of impregnation. For most purposes a material intermediate between the natural wood and the fully compressed material is required, and to obtain similar physical properties (water absorption) to the fully compressed material impregnation in some form is essential, with an unavoidable reduction of specific strength.



Impregnating 3 mm. veneers with phenol-formaldehyde resin. It takes nine of these veneers to make a ½-in. board.



Eleven "daylight" press for aeronautical and decorative work. Also used for a material with a high polish acetone finish.

Plastic Switches for All Occasions

In redesigning old switches and evolving new ones of unique design for special purposes, manufacturers are now giving premier consideration to the claims of both phenol-formaldehyde resins and also the amino plastics. The advantages claimed for plastics as against metal and hardwood are first of all its high insulating and, therefore, safety properties, attractive and permanent appearance and lightness in weight. We understand that in America coloured wall switches are installed in many of the new flats and that spare covers in different colours are available in case the rooms are redecorated. This seems to be an excellent idea as it quite frequently happens that the dark brown or black of a switch cover clashes with the general colour scheme and stands out like a sore thumb.

These bright ideas, which may at the time seem practical, are, however, often doomed to failure by the indifference of wholesalers and retailers.

* * *

Power Station for Every Home

A fortnight ago we were treated to a sensational story about a new French invention called the Helio-Electric Generating Cell which, although no larger than a pocket watch, is able to convert light into direct current. Apparently all that one has to do is to place the cells in the garden and then wire them up to storage batteries. The point of interest to the plastics industry is that these cells have a moulded case and as presumably several million will be necessary to undertake the work now performed by the Central Electricity Board we can look forward to a few busy years. It would, however, be a little premature for firms to place orders for tools just yet!

Plastic Bombs and Shells

We are continually giving publicity to peace-time applications of plastic materials, but it appears that they do not end there, at least if the hopes of Mr. A. S. Bevacqua are realized. This gentleman has just patented a method of making the individual parts of bombs, shells and projectile bodies of artificial resins and a fabric, fibrous or filler substance. The patent, B.P. 484,438, states that "The individual parts, i.e., the body of the projectile, the cylindrical portion, and the pointed nose portion, may be formed from a plurality of layers of cellulose asbestos, linen or cotton fabric, or paper impregnated with liquid artificial resin, or from a mixture of granulated or pulverized artificial resin, with or without the addition of phosphorescent substances and a vegetable or mineral filler."

* * *

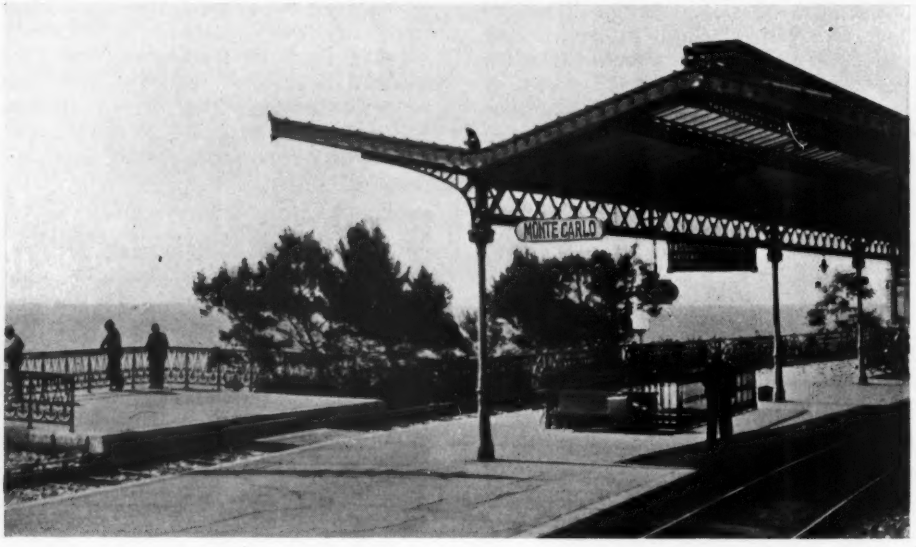
Celluloid Pipe Coatings

According to *The Scientific American*, July, 1938, celluloid is finding a promising new use as a pipe coating.

"Severe corrosion of the outside of pipe lines carrying oil and gas across country requires special measures to be taken to prolong the life of the pipe. Cellulose nitrate plastic has been successfully applied as a covering on cross-country pipe lines. The sheet of celluloid is softened in a solution of ethyl acetate, alcohol, and water, wrapped around the cleaned and painted pipe and allowed to dry. The coating shrinks in the process and fits tightly round even the irregularities of the pipe. This apparently expensive treatment is justified by the much longer life of the pipe in service."

We should imagine that the vinyl chlorides would be much more suitable for this purpose, as they do not deteriorate in the same way as celluloid.

PARIS—MONTE CARLO—ROME



PLASTICS ON HOLIDAY

By The Editor

NORMALLY I take no busman's holiday. I want, and get, a guaranteed minimum of 12 hours' to 15 hours' sun a day for the whole period of my holiday, plenty of swimming and good food. To search for plastics would have left me cold but for two reasons: one, that the cunning powers that be said that readers of *Plastics* would like a nice, chatty article on what's going on abroad and, two, that Agfa Photo, Ltd., had kindly asked me to review their new Karat miniature camera, which, as you probably know, has a very satisfying synthetic-resin moulded body to it. So that I couldn't help snapping something.

So see me wandering south, where I can get the required quantity of sun and heat (my best working temperature being in the nineties), and stopping first in Paris. Paris is not exactly a health resort in mid-July, but I had to stop there to see the reaction of Their Majesties' visit on the French people. You have all read about the amazing reception they received, but I don't think any print could give the real sense of fervour and delight displayed by the French. It was the nearest thing to love that I have yet seen displayed by a people, republican at that, for foreign royalty.

Even the customs, who usually ask me the number

Le Colisee, in the Champs Elysees, fitted throughout with moulded plastic table tops.

Hat shop in Rue Cambon with cast-resin door handles.

of machine guns and pounds of cocaine I am trying to smuggle through, smiled and chalked their cryptic design on my bags with delightful nonchalance. "Aha!" they seemed to laugh, "what is a gallon or so of nitroglycerine between friends?"

Not so our friends on the English side on my return. The Entente aroused no softening in their hard breasts. And the cross-examination they put me through when they found a few pairs of silk stockings I hadn't considered necessary to declare—and which I had bought for my little niece, aged three!

Oh, yes! Plastics, of course. Let us move and have a drink. How fortunate the plastics industry in France must be. Surely there are 10, 20 or any number of times you wish, more small tables per head of population in France than anywhere else in the world. The wonderful café system is a godsend to the plastics industry and the plastic table top a godsend to the café system. In England we have often seen the resin-impregnated laminated table top, but very rarely the moulded top from resin powder. In France the moulded top for the small table is very general.

In the accompanying photograph, which I took at great risk to life and limb, is seen one of the largest cafés in the exclusive Champs Elysées—Le Colisée. Here there must have been at least 50 such tables outside the café alone, each with a circular moulded top, and since the French are not afraid of colour, all were produced in a delicate green. Their excellent condition—and the use they undergo in café life is not gentle—spoke well of the inherent advantage in using moulded resin. Yet they are quite light and relieve the waiters of much strain when pulling them about. The old type of marble-topped table, and these are by no means extinct, seem to weigh a ton and are far from being things of beauty.

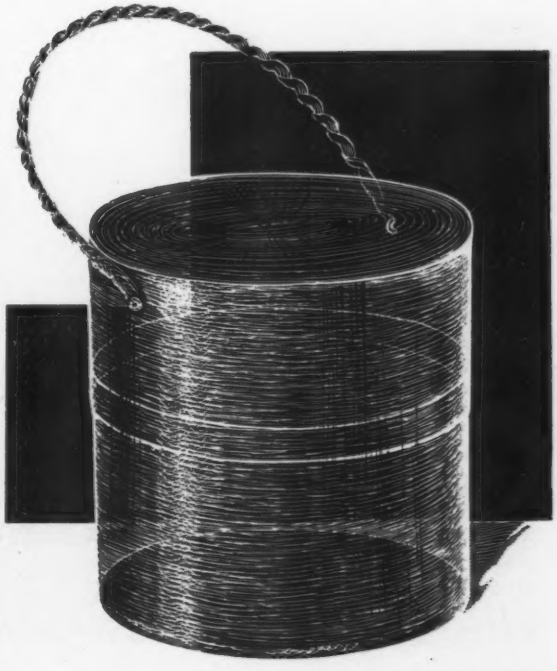
In the Boulevard des Capucines a new café has opened with very modern fittings, counter-top, tables and panellings being of laminated plastics in alternating red and black colours. Even the usual small utensils, ash-trays, serving saucers and egg-holders (hard-boiled eggs are highly esteemed by the early morning wanderers in Paris), are all carried out in attractive red to harmonize with the black of the tables.

By the way, I was interested to note that, during the Royal visit, the British Ambassador presented to H.M. the King two dolls for the Princesses, which were manufactured from Rhodoid. The dolls bore the inscription: "A Raynal Doll, made from Rhodoid. Non-inflammable and safe for children."

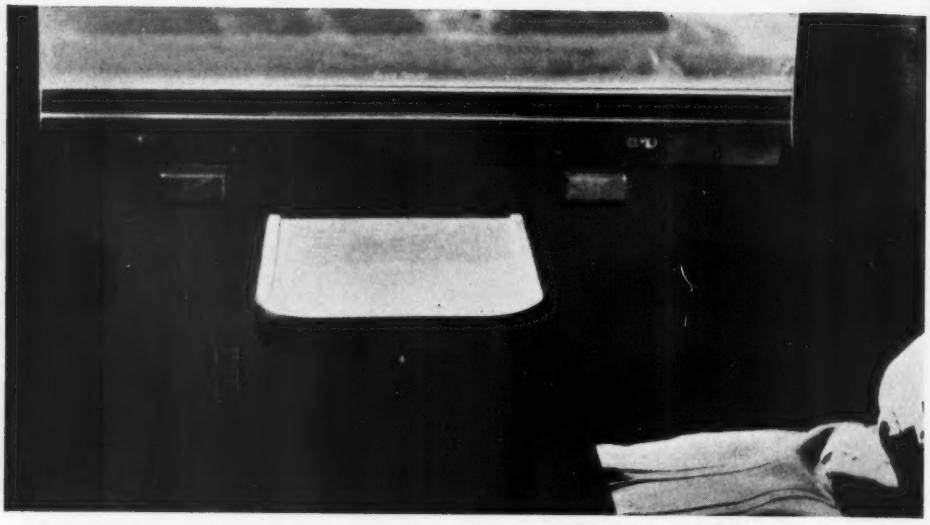
A swagger hat shop in the swagger Rue Cambon had modern door handles inside and out made of thick, solid cast resin of a pleasing amber colour. Here is the photograph, but it is not very satisfactory as I obviously moved slightly when taking it. I've faked it a bit.

Nothing more until we get farther south. I wake up in Nice, where the sun is so blinding and so hot that it is difficult to do more than lie on the beach with nothing on, just drinking long, cool drinks and turning slowly over to grill on the other side. Incidentally, I am much more proficient in giving details regarding eating and drinking cheaply and well, so if you want to know what they put in *soupe au pistou* or *bouillabaisse* or *pan bagnat*, just let me know.

However, I did see a couple of interesting things. In the Avenue de la Victoire there's a famous sweetshop called, in the delightful way the French have, "A la Marquise de Sevignée." And, judging from the prices within, it must have been the Marquise herself who had condescended to serve behind the counter. In the window was a beautiful cylindrical box made of trans-



The transparent acetate sweet box used by "A la Marquise de Sevignee" in Nice



Moulded table on the Faris-Lyons-Mediterranee train.

parent cellulose acetate of a delicate blue hue full of almond dragees. A gold cord was attached to the lid for carrying purposes. A lovely thing which showed up the contents to great advantage. But the price was so stiff, and I've long given up presenting lady friends with sweets, that I decided to reproduce it as a drawing instead of buying it and photographing it.

There's always sun on the Riviera for some 10 months to 11 months in the year, but it's not always beneficial. Hence the alacrity with which shopkeepers in this part of France have adopted transparent acetate blinds to prevent deterioration of delicate goods. In Nice I noticed a foodshop and a window containing fabrics fitted with them. The acetate sheet is coloured pale yellow, which prevents most of the injurious rays of the sun passing through.

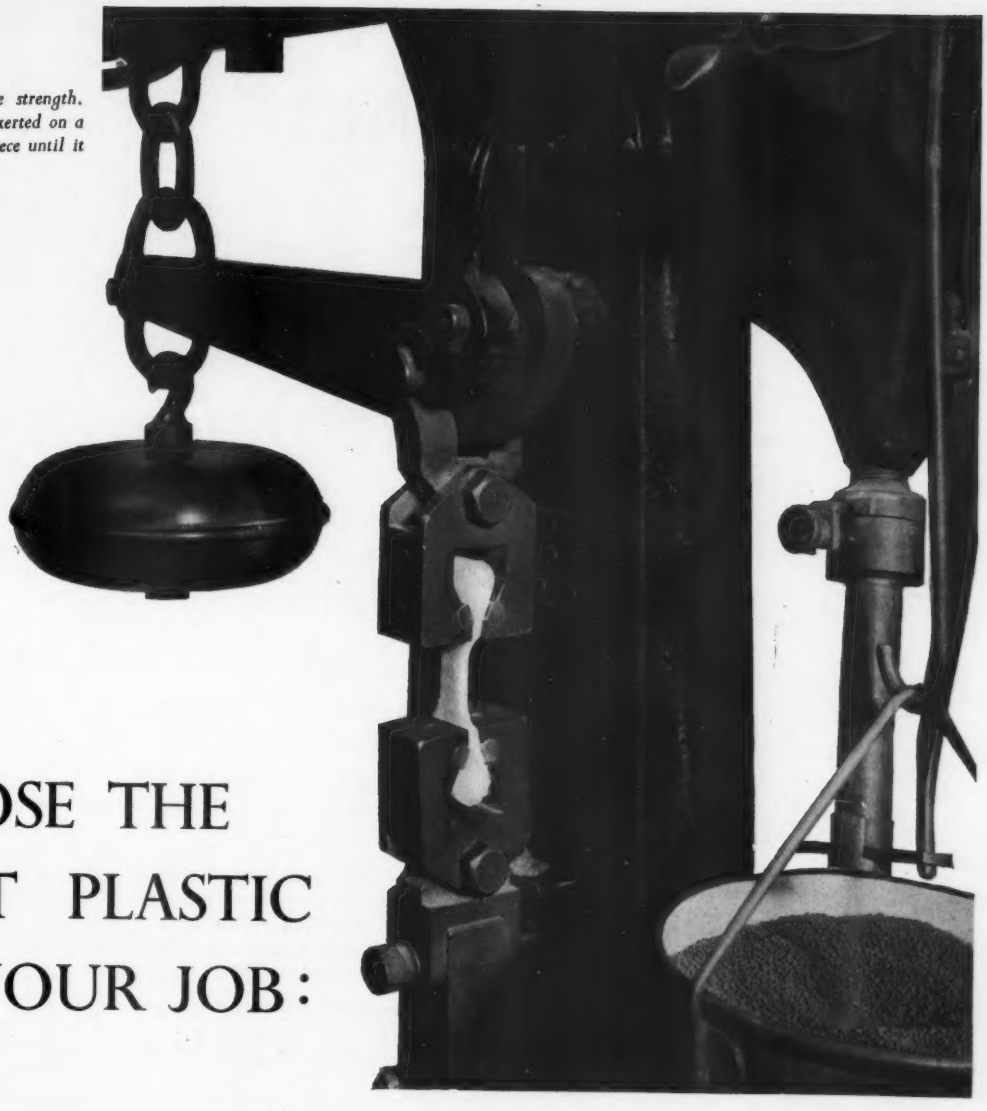
A textile-fabric shop in Nice fitted with an "Acetate" blind.

And here's my last note on the way from Nice to Rome. I've never regarded the French railway authorities as being more "go-ahead" than their British opposite numbers, nor as spendthrifts; but they have certainly introduced something new at last. The 8.30 a.m. from Nice to Vintimille (it had come from Paris) was fitted throughout with moulded flap tables. They were excellently made, 14 ins. by 16 ins., about $\frac{3}{16}$ in. to $\frac{1}{4}$ in. thick in the thinnest part, and carried strong moulded studs at least 1 in. thick on the underside to carry the metal runners. Little imagination, strangely enough, was shown in the choice of colours; they were all made in the very sombre brown mottle few of us admire.

By the way, if Agfa want a little advertisement for their Karat camera, apart from its amazing excellence as an instrument for taking good photographs, here it is. I accidently dropped the camera on the stone pavement in Rome, which it hit with a resounding crack on the moulded side. It suffered absolutely no damage and almost bounced up into my hand again!

I saw little in Italy to comment on, except the usual hundred and one gadgets in plastics. Nothing startling, since I presume Italy prefers to use her own natural resources for constructional and decorative work than to import much moulding powder or to make it from imported coal tar and other raw materials. Italy is a land of marble and wonderful marble workers, so that all exterior and interior work seems to be made of this. In the better cafés one sits at tables of real Carrara marble and eats soothing ice cream out of silver-plated dishes copied, surely, from Benvenuto Cellini's best designs. It may take some time to convert Italians to our methods.

No, there's little to report here. Besides, sipping my ice-cold beer in the Piazza San Marco in Venice, where, miraculous to relate, neither motorcar, motorcycle, nor even bicycle is even seen or heard, and listening to the municipal band, which plays real music and knows not jazz, I had begun my real holiday.



Measurement of tensile strength. An increasing pull is exerted on a dumb-bell shaped test piece until it breaks.

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INVENTIONS
477,911. Rubber. INTERNATIONAL LATEX PROCESSES, Ltd., MURPHY, E. A., and TROBRIDGE, G. W. July 10, 1936. No. 19130. [Class 70] [Also in Group VIII]
Aqueous dispersions of rubber which have

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Scrubbing brushes are now being made equipped with rubber backs, and they are specially recommended for household work because they do not damage the corners of the walls and can also be taken into tiny crevices. Then there are flexible rubber backs for clothes brushes, which allow the full surface of the brush to operate. It has been shown that this new and greatly improved brush has a vacuum-like effect in contact with cloth.

★

According to the July issue of *Soap*, a new type of applicator for applying self-polishing and non-rubbing waxes has been developed by Baldwin Laboratories, Seagertown, Pa. It is built on a rocker principle, which, it is claimed, enables easy diffusion and fast-spreading of liquid-type waxes on floors. The rocker action permits the spreader part of the applicator to follow the motion of the stroke and thus eliminate streaking and overlapping marks. The fabric part is of rubber-backed mohair, and during the pushing motion operates on the same principle as a squeegee window cleaner, while during the pulling motion it is said to act as a spreader and to place a thin coating of wax on the surface. The applicator is made in two parts with a spring base permitting the removal of the mohair for cleansing or changing.

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Model aeroplanes are becoming popular with all classes and ages of people and numerous model aero clubs have been formed in all parts of the country to encourage this fascinating and educative hobby. Whilst some of these models are equipped with tiny petrol motors and are quite elaborate and expensive affairs, others are constructed of Balsa wood sections stuck together with glue and the air screw is made to revolve by releasing the taut tension on a fairly thick strip of elastic rubber held between hooks. Special rubbers have been developed for the purpose of giving more power for weight, and the new Drome rubber made by Model Aerodrome, Sparkbrook, Birmingham, is one of the best known. A rubber motor consisting of six skeins (three loops) one yard long can give sufficient power for 80 secs. of flying an average-sized plane, 14 ins. diameter, 15 ins. pitch, Bala poop. Lubricants are available to preserve the elasticity of the rubber.

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A material known as "U.S. Micaphane," which is really a combination of powdered mica and thin, pure gum rubber stock, is being used in America for a number of interesting new purposes, including the production of rain capes and household aprons. The material has a soft, lustrous appearance, somewhat similar to silk.

★

By reinforcing rubber as used in the manufacture of belting with glass fibres, it is claimed by a recent British patent 482,774, that increased strength and flexibility are obtainable and the belts are able to withstand exposure to acid vapours or moisture without harmful effects.

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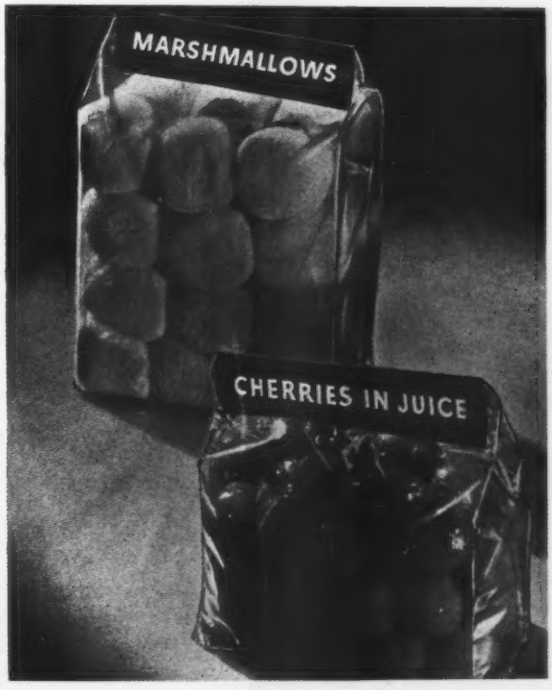
Pliofilm transparent bags are an economical and practical answer to many packaging problems where a high degree of resistance to either moisture absorption or loss of natural moisture content is required. Bags made of this new transparent rubber keep dry products really dry and moist products really moist because they are liquid-proof and sift-proof. They impart neither taste nor odour and are completely unaffected by contact with grease or oils. Where extra strength resistance to rough handling is required, bags of Pliofilm laminated to various grades of paper are available. The material is very suitable for large-scale packers as simple heat-sealing methods close Pliofilm bags with a strong airtight weld which is free from even minute leaks and suitable for packing products such as pickles in their own brine or vinegar, and fruit or vegetables in their own juice. Pliofilm containers are recommended for oysters, fruits, cakes, fruit drinks and potato chips, etc.



Food products look very appetizing in these new Pliofilm packs.

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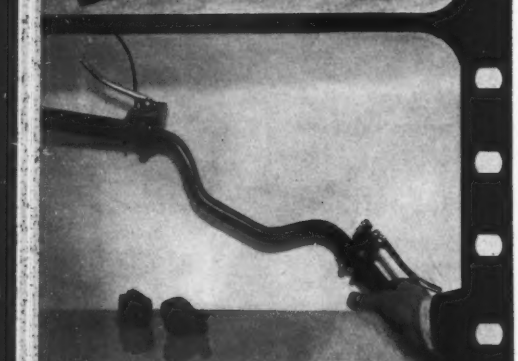
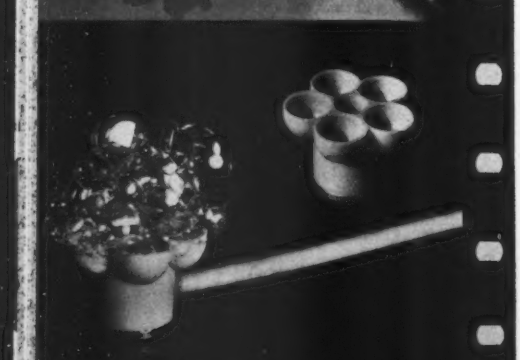
"General Release"—I

New and Interesting Plastic Goods





NO need to seek the shelter of the clubhouse when you wear one of these rainproof Pliofilm jackets specially made for enthusiastic golfers. The transparent jacket is not only fully protective, but in its smartly tailored form pleasing even to the critical eyes of Miss Eve.

ON the right is a new and distinctive table lamp with a fluted ivory column made of Catalin, a chromium base, and a durable shade with a matt surface tinted ivory to match. On the left is an attractive flower bowl. The flowers are placed in an inverted bowl full of water and in this way keep fresh for three or four weeks. The stands are of coloured crystal Catalin and reflect the light in a very delightful manner.

THESE Catalin dress ornaments are quite the latest and guaranteed to give that last finishing touch to the smartest dress. Catalin blends delightfully with practically all metals, in fact some of the most distinctive buttons, buckles and clasps, made both in London and Paris, are due to the happy marriage of this cast resin and metal.

MANY of the most up-to-date cycles and motor-cycles are equipped with these moulded Bakelite fittings, which ensure that the brakes and three-speed gears are held rigidly in position. The mouldings are shock-resisting, and, of course, they do not deteriorate or become affected in any way by exposure to the weather. Charlesworth Mouldings, Ltd., are responsible for the moulding.

HERE'S the latest thing in the soap bubble line. The pipe is moulded in amino-resin powder and is specially designed to produce bigger and better bubbles for the youth of to-day and possibly to-morrow.

THIS streamlined and efficient-looking motor lorry is provided with Catalin lettering which certainly does enhance its appearance. Catalin, the well-known cast resin, is now extensively used for making letters and signs for commercial vehicles.

"General Release"—II

New and Interesting Plastic Goods

THE famous Elastoplast surgical plaster made by T. J. Smith and Nephew, Ltd., is now available in new moulded containers which are designed for simplicity and instantaneous use. They are moulded of Mouldrite W.F. powder by Prestware, Ltd., Merton. London, S.W.19.

MOULDED Plaskon jewellery caskets are now very popular in the States, and these examples certainly do look attractive. Experience shows that purchasers generally prefer the moulded caskets to similar ones made of other materials, as the former have a much better finish and one which is, of course, absolutely permanent.

TO celebrate the centenary of the well-known firm of George Kent, Ltd., this concern has had a souvenir made representing in miniature the well-known K.M.-type Flow Recorder, which is used in countless industries for measuring the flow of water, steam, gas, oil and other fluids. The souvenir is moulded in a grey tone of Scarab by the Streetly Manufacturing Co., Ltd., and on the face are two printed cellulosed labels, the larger representing a recording chart. The outer casing forms a cover for a magnifying glass and also serves as a handle for the glass when it is opened out.

MOULDED Bakelite handles are becoming increasingly popular for domestic appliances, and the latest G.E.C. electric kettle is a good example of the use of well-designed and sturdily moulded parts. Incidentally, the moulding for G.E.C. lines is carried out at the company's Witton Works, Birmingham.

A NEW form of wallplug which is proving a best seller in this country is the Philplug, which is primarily a plastic composition possessing several rather unusual features. General Electric Co., Ltd., are the sole distributors to the electrical and radio trades for the new wallplug.

INGENIOUSLY designed and cleverly translated into plastics, this container for "June" perfume deserves an honourable mention. The Streetly Manufacturing Co., Ltd., are responsible for the moulding, and the material is Scarab T. The perfume is contained in a glass vial concealed within the pillar portion of the sundial.

These are typical posters issued by that excellent organization, The National "Safety First" Association, whose work deserves commendation.

SAFETY FIRST AND LAST

ALMOST everyone knows that the use of safety glass for motorcar windows has done a great deal to lessen the disastrous effects of road accidents, and, of course, it owes its charmed life to the thin lamination of celluloid or similar plastic sandwiched between two sheets of plate glass. This is undoubtedly the best-known example of the important part played by plastics in helping to make modern life a little less dangerous.

Apart from important contributions made to safety on the roads by plastics, which not only include laminated glass but also road signs and reflectors, they are finding various applications in industry for the construction of safety devices. A large number of non-splintering goggles and eyeshields are being made of celluloid, cellulose acetate and also Perspex for use by miners, engineers, quarry workers and many other types of industrial workers. The prevalence of eye injuries in modern industry is astonishing, and at one hospital alone, the Royal Eye Hospital, St. George's Circus, Southwark, 7,000 cases of industrial eye injuries are treated every year, and an average of 50 eyes have to be removed. Commenting on these figures, the hospital authorities estimate that 80 per cent. of these injuries could be prevented if the employers would encourage their workpeople to make use of suitable devices, such as veils, screens or goggles.

Although the majority of these preventative devices are made of safety glass, the use of single thicknesses of acetate material, about $\frac{1}{4}$ in. thick, is sometimes preferred on account of lightness in weight, which is an important factor when the eyeshields or goggles are to be worn all day. As regards transparency, the clearest and most transparent material available is Perspex, which has higher light transmission properties than ordinary glass, and writing is perfectly legible in viewing it through a rod of the material 28 ins. long held lengthwise. Helmets for miners are also being made of plastics in the form of laminated, moulded and impregnated material. These are a good deal lighter than the ordinary so-called tin helmets and, therefore, more comfortable to wear. Probably the toughest and most serviceable of the new helmets are those of resin impregnated canvas suitably reinforced at certain points to afford the highest degree of protection.

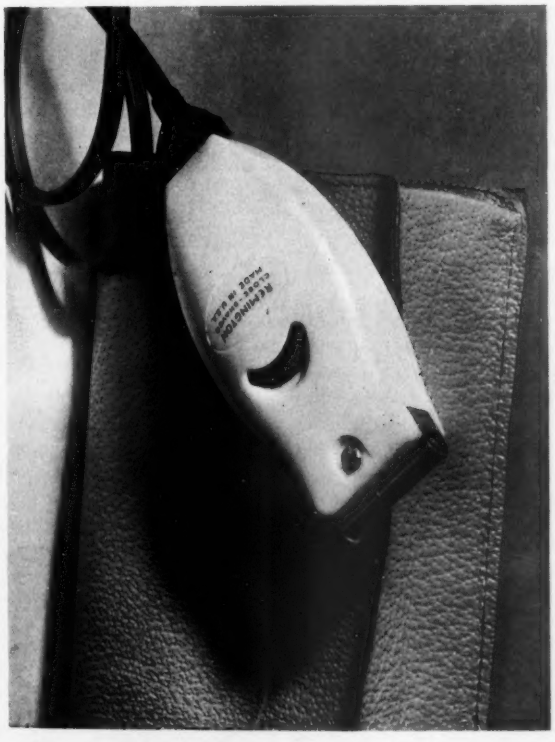
The use of cellulose acetate and celluloid for guards is also becoming increasingly important in a number of factories. For instance, grinding wheels which let off a considerable amount of fine dust are now equipped with transparent plastic covers, which help to prevent accidents. In America a more extensive use is made of cellulose acetate guards than in this country, and many pieces of plastic machinery, including the latest Reed-Prentice Injection moulding machines, are provided with a safety gate consisting of a large frame of thick acetate material. The great advantage of cellulose acetate for machine guards is that it affords full visibility.

Perspex and wire-reinforced acetate sheeting, such as Armourbex, are being used for other safety purposes, particularly for protecting lights in bakeries, kitchens and food factories, where it is essential that there shall be no risk from broken glass entering the foodstuffs during preparation. The super-quality Armourbex, consisting of clear Bexoid (80/1,000 in.) reinforced with a $\frac{1}{2}$-in. wire mesh, which is welded at every joint, is not only blastproof but almost burglarproof. The extreme toughness makes it specially suitable for explosive factories, where it takes the form of ordinary "plate glass."

SHAVE, SIR!

WHEN the electric hair clipper proved its ability in the hairdressing salon it became obvious that sooner or later an electric dry shaving device would put in an appearance. To-day, there are several well-known models on the market which appear to perform their useful function both efficiently and quickly, and combine small bulk with smart appearance.

Fundamentally, the electric shaver is quite simple in design and action. In the main, it consists of a tiny electric motor encased in a moulded shell or housing which causes the tiny steel cutters to vibrate at high speed behind a protective steel mesh bar. This is so designed that whilst allowing the hair to pass through and guiding it to the shearing head it prevents all possible accidents. Apart from blowing out the motor by plugging the shaver into the wrong



The Remington-Rand close shaver owes its distinctive appearance to the moulded body.

voltage the instrument is more or less foolproof and can be relied upon to give excellent service for several years provided ordinary care is taken.

There is no doubt that in spite of its high price, most of the models retailing at £3 or over, the electric shaver is becoming increasingly popular. Advertising campaigns have stressed the fact that the biggest advantage to be gained from the use of the electric shaver is that it greatly simplifies and shortens the

Simple to use and perfectly safe owing to the excellent insulation of the plastic housing.

operation of shaving and, incidentally, leaves the skin in a healthier condition as it does not scrape or cut below the surface of the skin. The economics of shaving have not been given very much prominence, although it might well be thought that the electric shaver would work out a good deal cheaper over a period of, say, three or four years.

Most of the electric dry shavers on the market at the present time have moulded housing for the fractional h.p. motor and actual works of the machine, and these undoubtedly improve the appearance and render them a good deal safer to use. A well-designed phenol-formaldehyde or amino-resin powder moulded body can give the highest degree of electrical insulation and ensure freedom from shock even when the user's hands are wet or moist. Then, again, it is light and so helps to make the whole unit easy and comfortable to handle.

Another important point is that from a production standpoint moulded housings leave little to be desired, as once the tool is made it is possible to turn out any quantity at very short notice and at a reasonably low cost. From the sales angle, the contributions made by plastics are very tangible and include durable finish, fine appearance and colour. It is quite a mistaken idea to imagine that men like only drab colours, as any outfitter will tell you that the brighter dressing gowns sell the best and most pyjamas are a riot of colour. Certainly he likes his shaving kit to be bright and cheerful and the use of plastic makes this possible with the minimum of cost and trouble; moreover, the colours are really permanent and do not wear off. The Remington-Rand close shaver is probably one of the most attractive models on the market to-day and its immediate popularity clearly shows that the moulded body of cream amino-plastic material makes a ready appeal.

It must not be forgotten that the electric shaver also makes use of at least one plug fitting moulded of Bakelite or similar resin, and in the case of the Remington-Rand a moulded resistance is provided which enables the shaver to be used on any voltage.

There is no doubt that plastics are helping to sell the public this new idea of electric shaving and, indeed, succeeding where other materials would have encountered serious difficulties. Although only a fraction of the population can at present afford one of these appliances, there is always a very promising and lucrative market for the very best, irrespective of price.

IT'S A GIFT—

Especially if moulded articles are chosen for your new schemes

IT is human nature to try to get something for nothing, and during the past 10 years manufacturers have kept this human weakness in mind when planning sales promotion schemes. The free gift is one of the surest, and in the long run the most certain, method of launching new business lines or rejuvenating old-established ones.

Planning free gift schemes causes a lot of headaches because the scope is so rigidly controlled by the very limited amount of money available and the necessity of choosing a gift bearing a close relation to the actual purchase. Then again there is the question of compactness and breakages. Manufacturers are generally opposed to the use of anything liable to break easily and so complicate their transport problems, and retailers are never enthusiastic about new lines that are awkward in shape and difficult to store in the small amount of shop space available.

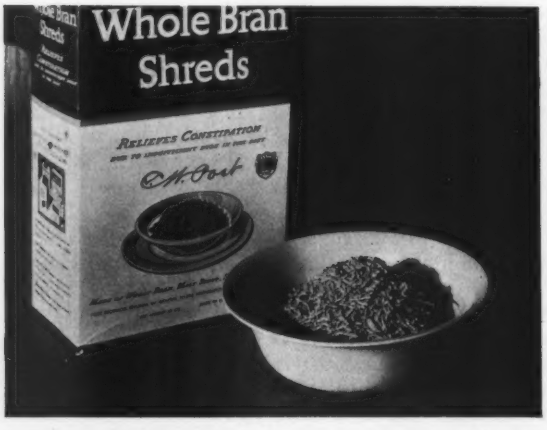
Plastics are an obvious choice for making a wide range of useful gift articles because they are so economical for mass production work, light in weight, practically unbreakable under normal conditions and obtainable in a wide range of pleasing colours. The popularity of plastic mouldings is also an important factor, and is no doubt responsible for the success of recent schemes making use of small pieces of tableware.

One of the most interesting of present-day gift schemes is that launched by the manufacturers of Post Toasties and takes the form of a Bex moulded dish which is given away free to purchasers of a packet of their all-bran cereal. The name Bex, which is, of course, the trade name of the British Xylonite Co., Ltd., is sufficient guarantee that the dish is well worth having.

Another well-known food product firm making use of a plastic gift is Vita Concentrated Juices, Ltd., who are providing purchasers of their Vita Grape Juice with a moulded measure. This is tumbler-shaped and of a pleasant grass green colour which harmonizes very well with the wine-coloured contents of the bottle and the gaily designed label. A point of interest about this moulded measure, which fits snugly over the neck of the bottle, is that when enclosed in the transparent cellulose wrapper it gives the bottle an unusually smart and novel appearance. Retailers handling this food drink admit that the plastic measure stimulates sales to a considerable degree.

Pharmaceutical and toilet preparations can often be accompanied by useful accessories, generally given away free with one or more purchases, and several well-known firms have in the past made good use of small plastic mouldings. For instance, moulded eye baths for special ophthalmic solutions, measures for various types of medicines, small containers for pills and capsules and tumblers for dentifrices. Apart, however, from pressure mouldings there is no doubt that injection mouldings made from thermoplastic materials also have interesting possibilities as free gifts. These are available in a wide range of colours as well as clear transparent, translucent and opaque shades and in a variety of attractive mottles, including tortoise-shell and pearl effects.

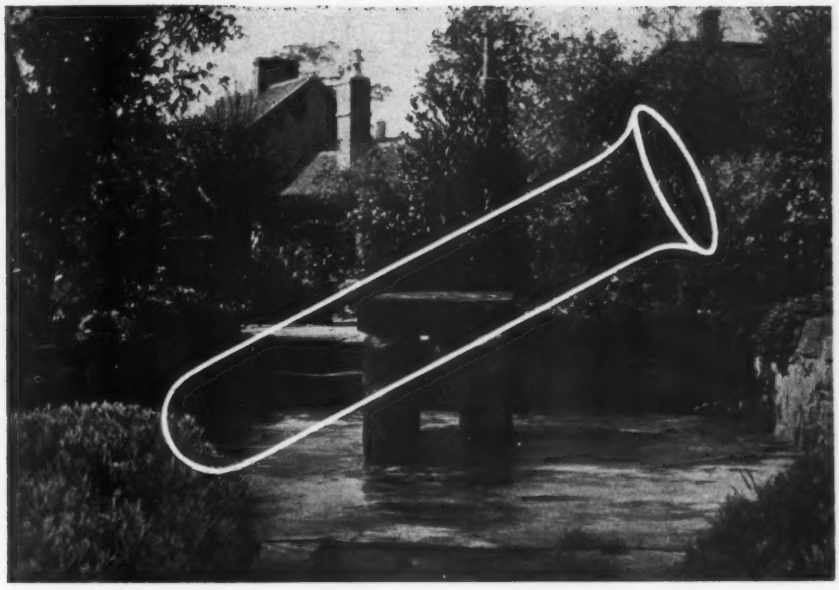
The point to bear in mind about all plastic mouldings, whether they are thermo-plastic or thermo-setting, is that being light and non-brittle, the retailer is not likely to encounter serious storage difficulties. Commercial travellers with experience of exploiting gift schemes speak feelingly of the reaction of retailers to any scheme where the gift is of a fragile nature, such as china or glass.



General Food Corporation, U.S.A., have chosen this Bex moulding for their new Whole Bran gift scheme.

This measure of amino-resin powder was moulded by E. Elliott, Ltd., Birmingham.

Science in the Garden



EVERY gardener knows of Mr. Middleton, and it is no exaggeration to say that his advice is closely followed by countless thousands of that vast Sunday afternoon audience. This homely broadcaster, who has become almost as famous as a film star, told us some months ago about the importance of growing plants in the right soil; marigolds require an alkaline or limey soil, whereas hydrangeas need a slightly acid or heavy soil, and magnolias a neutral soil.

Experienced gardeners know almost instinctively the fine differences between the various types of soil found in one locality, and how to doctor it with fertilizers and chemicals so as to make it suit special plants. Unfortunately, however, the great majority of what might be called week-end gardeners lack this specialized knowledge, and in consequence it is a matter of luck if the soil happens to suit the plants. This is where science now lends a helping hand by providing a simple apparatus with which it is possible to determine the condition of the soil, that is, the degree of acidity or alkalinity, both accurately and quickly.

The Pehameter shown in parts and fully assembled ready for use

This apparatus, which is sold in this country by Baird and Tatlock, Ltd., is known as the Pehameter, and is to a considerable extent moulded of phenol formaldehyde resin reinforced with metal. It is not only designed for easy use and efficiency, but it is sturdily made, well balanced and not likely to be easily knocked over.

This outfit is proving very popular with horticulturists and nurserymen, and the fact that it is mainly constructed of plastics ensures that there is no risk of corrosion due to damp atmospheric conditions, which would soon rust a metal-made apparatus.

Besides the soilometer, as it is sometimes called, plastics might well be used for making the cases of greenhouse thermometers. At present practically all of these are made of metal, and the calibrations soon get rusted over and difficult to read. In the case of moulded thermometer parts, the calibrations could be in white on a black ground.

Many gardeners would welcome help in the way of charts or instructions giving information as to the most suitable time to plant out, sow seeds and do other seasonable jobs. Admitted, these timely hints are published in the various gardening papers and broadcast by our Mr. Middleton, but newspaper cuttings go astray and the human memory is not infallible. What is needed is a means of recording all this necessary information in a permanent way. Use might well be made of printed Tufnol, which is semi-translucent, strong and rigid. The printing, which is below the surface of the sheet, is protected from attacks by acids or chemicals, fumes or climatic conditions. It does not deteriorate with age, and any oil, grease or dirt can easily be wiped from the surface of the sheet. In fact, under normal circumstances printed Tufnol is practically indestructible.

Apart from the use of plastics for the specialized purposes mentioned, it is finding other important scientific and practical applications in the garden. In America nurserymen are now using cellulose acetate coated wire mesh as a sash material for cold frames, and also for making hoods to protect delicate plants.

Interesting New Use for Celluloid

IN *Chemistry and Industry*, June 18, 1938, two well-known corrosion engineers, U. R. Evans and R. S. Thornhill, gave some interesting details concerning the best methods of constructing apparatus with celluloid sheets.

For many researches into the corrosion of metals and electro-chemistry generally, it is highly desirable to use apparatus of straight-walled, rectangular form. Satisfactory straight-walled vessels of the required sizes are often difficult to procure in glass, and in the Cambridge Corrosion Laboratory much use has recently been made of wax-covered celluloid sheet.

The first apparatus was constructed of ordinary "nitrated" celluloid containing camphor, the sheet used being 1.2 mm. thick. This can be cut cleanly with a large photographic print trimmer, or, alternatively, it can be scored with a sharp knife and broken; circular holes can be pierced by means of a "Twirlit" paper drill (No. 200). By wetting the edges of two pieces of celluloid with commercial nitrocellulose adhesive ("Durofix") and pressing them together, they can be rapidly cemented to form a strong L-shaped union (Fig. 1); alternatively, it is possible to join two sheets parallel with one another (Fig. 2). In either case, hardening takes place very rapidly, since the solvent of the adhesive (amyl acetate) is absorbed into the celluloid on each side. Thus, whereas in attempts to join together two sheets of non-porous material (such as metal) the adhesive remains soft for long periods, joints between celluloid harden within an hour and become quite strong; excessive amounts of adhesive, however, should be avoided. Small bubbles usually appear between the two sheets (Fig. 3) and there is frequently a slight alteration of shape owing to the volume changes involved when the solvent passes into the celluloid; these matters must be kept in mind when designing apparatus.

It is easy in this way to construct rectangular cells capable of holding liquid, but before use they should be waxed, since this type of celluloid is porous and contains at least one water-soluble constituent. Waxing should not be carried out until the joints are hard; molten wax can then be applied by means of a brush, special attention being given to the corners and joints; the wax wets the celluloid and forms an excellent coating. If desired, the ends, sides and bottom of the apparatus may in turn be immersed in the molten wax contained in a shallow vessel (an aluminium frying pan is convenient), but for this purpose the wax should not be too hot nor should the time of immersion be prolonged, since the material tends to soften and lose its shape.

The great advantage of celluloid is the possibility of the rapid construction of relatively complicated apparatus, cut to the exact dimensions desired. The cells used by one of us for the electro-chemical transfer of oxide films were constructed wholly of celluloid. Each cell contained three different compartments, with grooves for the diaphragm and ledges for supporting the specimens; one of these cells was used for at least 50 transfers without any sign of leakage. Similarly, waxed celluloid apparatus has been used by us for parts of the apparatus constructed for the study of electric currents flowing over the surface of corroding iron, and still more extensively in the further development of the same research; it is also being used in the researches on corrosion-fatigue now being conducted in this laboratory by Dr. A. J. Gould.

A serious disadvantage of the use of waxed celluloid is that the apparatus cannot be cleaned from sparingly soluble matter adhering to the walls; moreover, it cannot be heated and cannot be used for reagents which would dissolve or attack either wax or celluloid. Another disadvantage is the inflammability of ordinary celluloid. The possible danger arising from accumulations of clippings on the benches and floors is obvious; it is advisable to make rules that all shavings and other fragments should at once be placed in a metal box. To avoid this disadvantage, it has lately been decided to use the non-inflammable "acetate" celluloid, which is obtainable commercially as sheet 1.25 mm. thick. It is impossible to cement this material with nitrocellulose adhesive, but a 10 per cent. solution of cellulose acetate in acetone gives excellent joins. In cases where two parallel sheets have to be joined together this material is somewhat superior to ordinary cellulose, since bubbles produced between the sheets are smaller and less numerous. The material is somewhat less easy to cut cleanly, but with a little care this can be achieved, and recently satisfactory apparatus has been produced from this variety of celluloid. A waxed acetate-celluloid trough, measuring 18 by 4 by 7 cm., was used to contain N sodium chloride for an hour and then thoroughly rinsed in distilled water for a further hour; on pouring off the water and testing with silver nitrate no chloride could be detected. For long-continued experiments "nitrated" celluloid appears to be more suitable.

Another application of celluloid lies in the mounting of metallic specimens intended for experiments on corrosion, and particularly in the masking of the cut edges. As has long been known, attempts to mask the bare edges of metallic specimens by means of paraffin wax are not always successful, because the wax fails to wet the metal, and somewhat serious corrosion may arise in the crevices between wax and metal. At Cambridge the difficulty was previously overcome in a number of

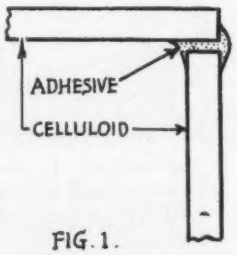


FIG. 1.

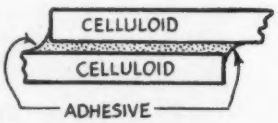


FIG. 2.

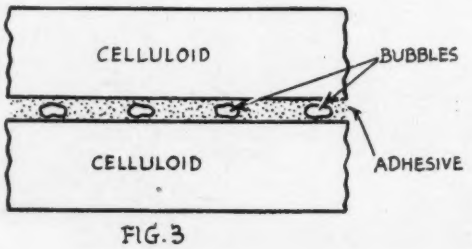


FIG. 3.

wax ; if a priming solution of wax in carbon tetrachloride is first applied a porous layer of wax is left behind on evaporation, and molten wax, applied later with a brush, wets the surface comparatively well.

By making use of nitrocellulose the problem has been greatly simplified. The specimen can be attached by Durofix to a (slightly larger) celluloid plate, which is intended to protect the back and confer rigidity on the whole. On pressing the metal into the adhesive by means of a rubber block (or, if the rubber be not permissible owing to its sulphur-content, by means of a suitably shaped piece of dry celluloid), the adhesive is caused to rise above the level of the metal on all sides, protecting the edges (Fig. 4). When it has hardened, molten wax can be applied by a brush to the back and edges of the celluloid plate, as well as to the adhesive heaped up around the margin of the metal. The molten wax wets the nitrocellulose but will not wet metal; consequently, if the brush is run over the nitrocellulose at a small distance from the junction of the metal the molten wax will flow over the nitrocellulose to the edge of the metal and there stop. In this way the specimens receive a complete wax-covered frame, with the metallic surface somewhat "sunk" below the level of the frame itself—a feature which may be an advantage for some purposes and a disadvantage for others. Hitherto, "nitrated" celluloid has been used for mounting, but possibly the process could be adapted to the non-inflammable "acetate" variety. If the metallic specimen is to be subjected to corrosion in a horizontal position the celluloid plate which carries it may be attached by wax to the bottom of a rectangular celluloid cell. If vertical corrosion be desired the specimen can form the side of the vessel, but at Cambridge it is more usual to use a T-shaped celluloid plate which is allowed to hang in a rectangular glass trough (Fig. 5). Either complete immersion or partial immersion can thus be obtained without difficulty.

In order to avoid complications caused by evaporation, which involved gradual sinking of the water-line and unnatural stirring whenever water is added to replenish the loss, attempts are now being made to use a "two-storeyed" apparatus. Here it is possible to keep the apparatus open to the atmosphere and yet to arrange that the evaporation occurs from the water in the upper storey. This form of apparatus is now being tested, and while it may require modification in detail, the principle appears to be sound. In the present form of cell, the upper storey is composed of celluloid and the lower part of glass.

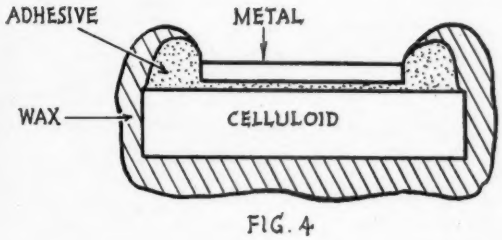


FIG. 4

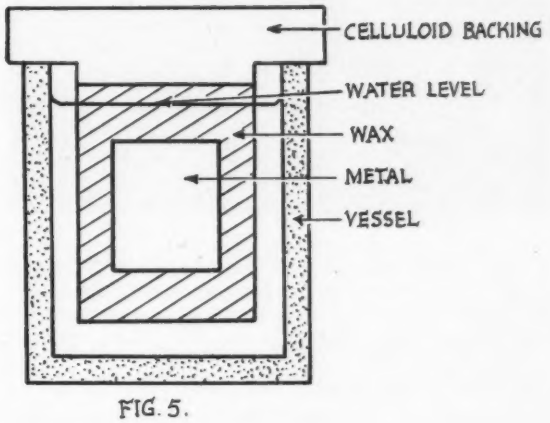


FIG. 5.

Hydroponics and Plastics

For those unfamiliar with the new science of hydroponics, may be explained that it refers to the method adopted by Dr. Lamory Laumeister, of California University, of growing vegetables in water instead of soil. On Wake Island in the Pacific Dr. Laumeister has an experimental garden consisting of tanks filled with chemically treated water, which yield continual crops of lettuce, beans, carrots, cucumbers, tomatoes, melons and even pineapples. Although it is early in the day to make any forecast of the future of hydroponics, it is no exaggeration to say that it is exceedingly promising. The chief point of interest to the plastic industry is that ordinary galvanized metal tanks have been found unsuitable, owing to corrosion, and difficulty has been experienced in overcoming this as the presence of free metallic salts in the water is liable to interfere with true biological functions of the plants. Metal tanks can, of course, be given a protective coating of synthetic resin, but a better suggestion would be to use specially moulded tanks made of Keebush or Haveg cold moulding resins. Such tanks would be free from all possible objections and able to give excellent service indefinitely.

New Plastic Developments at the Leipzig Autumn Fair, 1938

Considerable progress has been made in the German plastic industry during the past year, and not only has the physical strength of mouldings been improved, but important advances made in the enhancement of decorative effects. Some months ago it was discovered that the addition of aluminium powder to the resin created novel ornamental effects resembling those of clouded silk. By the juxtaposition of colours and metallic powders as fillers, a new and fascinating range of decorative surfaces is possible and many of these will be shown at the Leipzig Autumn Fair which is to be held from August 28 to September 1, 1938. A large number of gift articles for men in cast and moulded resins and silver are also to be exhibited at the Fair, and, judging from early reports, business is likely to be very brisk.

Plastic Hooks and Eyes

Among the novelties now being exhibited in the American dress shows, forecasting autumn fashions, are transparent hooks and eyes made of plastic material, which is stated to be washable and practically unbreakable. Sponsors of this new idea are Castle Novelties, Inc., of Los Angeles. They claim that the new fastenings are a definite advance on the old metal type since the plastic articles, being transparent, take up the exact shade of the dress on which they are mounted, and are, therefore, most unobtrusive. Efforts are being made to design other types of dress and corset closures, such as press studs, in the same material. Some of these other fastenings, when made of metal, are even more unsightly than the hook and eye. In plastic material they become almost an ornament.

THERMOPLASTIC MOULDINGS FOR ELECTRICAL PURPOSES

By E. E. Halls

CERTAIN of the plastics produced in sheet form were found to respond to hot pressing operations, and by this means to serve a wide range of applications. In effect the process was that of moulding sheet material, an operation which was rendered possible by the fact that under the influence of heat these materials became soft and plastic, returning to their original rigidity upon re-cooling. It was evident that the availability of them in powder form together with the development of suitable equipment and technique to take advantage of their thermo setting characteristics would provide a valuable addition to moulding processes. These points were soon realized and the last decade has seen the gradual building of an extensive field of thermoplastic moulding using synthetic powders of a number of different types. The perfecting of the injection method of moulding afforded the chief impetus in bringing thermoplastic moulding powders to the fore.

The first important thermoplastic moulding powder was cellulose acetate and this still provides the bulk of production. Cellulose acetate mouldings comprise three chief varieties, transparent or translucent, opaque pigmented in various colours, and wood flour filled forms which likewise are opaque and possible in many colours. Styrene and acrylic moulding powders are relatively newer members of the thermoplastic series, but their useful characteristics are such that they are rapidly establishing themselves in fields for which they are particularly suited. Both can be supplied in glass-clear or opaque modifications in any colour shade. Articles can be produced from them, either by injection or hot moulding. Another cellulose derivative, very similar in characteristics to the acetate group, is benzyl cellulose. This material is not widely employed, and has no outstanding practical advantages over the three groups already enumerated to warrant further reference to it herein.

As already indicated, the outstanding feature of the thermoplastic moulding powders, in contrast to the thermosetting varieties, is the speed and ease with which mouldings can be produced by the injection process. Briefly the injection process comprises the loading of the powder through a hopper into a heated chamber, from which it is expelled into the mould by means of a ram. Split moulds are utilized, one section being clamped over the outlet from the pressure chamber and the other so arranged that when injection is completed it can be withdrawn for easy extraction of the moulding. Injection, opening and closing of the dies are all incorporated in the forward or backward motion of the operating mechanism. Whether single or multi impression moulds are involved will depend upon the size and configuration of the article to be moulded, as well as upon the output desired. This moulding process, like others, involves temperature and time factors which are critical but dependent upon the particular conditions obtaining. The moulding powder in the heating chamber needs to be at the correct temperature, and its injection to fill the mould completely must be performed at such a rate that this is effected by the time that the plastic mass chills. A time lag is then required for cooling down to a temperature corresponding to a degree of rigidity to enable extraction of the article from the mould to be accomplished without its distortion.

Sufficient has been said in the last paragraph of the moulding process to emphasize that it is not feasible to regard thermoplastic moulding as adaptable to any and all mouldings without paying full regard to volume, intricacy and service function. Where these are fulfilled, the outstanding feature of the thermoplastics is economic production, especially on the basis of speed.

The long use of cellulose acetate in various forms has demonstrated that it is inert and stable in the chemical sense, and therefore in electrical applications can be employed without giving rise to anxiety with respect to chemical corrosion or electrical leakage under potential. When in service under moist or damp conditions, moisture absorption occurs but not to an extent which is detrimental to the dielectric characteristics of the material. The actual water absorption is not only dependent upon external conditions but also to some degree upon the composition of the moulding powder. Under the standard test conditions of complete submersion in water for 21 days, the increase in weight is of the order of 10 per cent. maximum. The corresponding effect upon dimensions would be an expansion of the order of 2 per cent. maximum. Under the reverse conditions of dry heat, a loss in weight with shrinkage occurs upon continued exposure to warmth, while if the exposure temperature is excessive, distortion or collapse may occur. This limiting safe temperature is dependent

upon the time for which the moulding is continuously exposed at the temperature and also upon the stresses to which the article is subjected by virtue of the method by which it is mounted. In any circumstances, 60 degrees C. (140 degrees F.) should be regarded as the maximum safe temperature to which the article should be exposed in service, although admittedly numerous specific instances arise where periods at somewhat higher temperatures are satisfactory. Under the standard test condition of 21 days' exposure to dry heat at 60 degrees C. the maximum weight loss is of the order of 6 per cent., while maximum shrinkage is of the order of 2½ per cent.

Exposure to strong light for more or less continuous periods tends to result in a darkening of the lighter colour shades due to yellowing. For electrical purposes, black and nut-brown are the most popular colours, and the colour deterioration does not assert itself seriously. With the whites, blues, greens, etc., the colour change must not be overlooked if appearance is a paramount feature, and colour must not be regarded as permanent to the same degree as exhibited by the amino plastics. No electrical deterioration need be anticipated with colour change.

Electrically, acetate mouldings compare very favourably with the thermosetting plastics. Electric strength at 20 degrees C. and 50 cycles is of the order of 300 to 500 V.A.C. per mil., while power factor is of the order of 3 per cent. at 800 cycles. Furthermore, acetate is not prone to "tracking."

Styrene mouldings exhibit one or two outstanding characteristics from the electrical viewpoint. The principal electrical mouldings reveal an exceedingly low power factor (of the order of 0.02 per cent. at 800 cycles) and are suitable for operation at the high frequencies employed in radio transmission. This signifies that many complex components can be moulded from the styrenes, superseding more elaborate constructions from special materials of ceramic base. Electric strength is at least equal to that of acetate.

Another outstanding characteristic of the styrene group is resistance to moisture absorption. The weight increase under the 21-day water immersion test is 0.1 per cent. maximum, and corresponding dimensional changes are unmeasurable.

The limitations to heat exposure are similar to those displayed by cellulose acetate. Loss in weight upon extended exposure to dry heat at 60 degrees C. for 21 days is of the order of 0.25 per cent. max., while the corresponding reduction in dimensions is of the order of 0.75 per cent. max.

The styrene mouldings are inert and chemically stable, and, subject to the observance of the temperature limitation, may be regarded as electrically stable under all conditions within their capacity.

The acrylic mouldings fall intermediately between the cellulose acetates and the styrenes. They are polymerized esters of acrylic acide derivaties, methyl methacrylate being the notable example, and as such are chemically inert and stable. They give rise to no corrosion or electrical leakage problems in electrical applications. Water absorption is reasonably low, 21 days' complete immersion giving values of the order of 0.6 per cent. maximum. Dimensional expansion under these conditions is of the order of 0.25 per cent. max. They are therefore safe for use under damp conditions, exhibiting superiority over cellulose acetate in this respect. Exposure to dry heat again involves a temperature limitation, exactly similar to that imposed for acetate. Weight loss under the standard test of 21 days at 60 degrees C. is of the order of 0.75 per cent. max., with a corresponding shrinkage in dimensions of the order of 2 per cent. max.

Electrically, the acrylic mouldings will exhibit an electric strength of the order of 300 to 500 V.A.C. per mil. at 50 cycles and 20 degrees C., and a power factor of 3 per cent. at 800 cycles.

In common with other forms of mouldings, machining operations on thermoplastic mouldings are almost entirely confined to drilling and tapping operations. From a purely machining point of view, cellulose acetate, styrene and acrylic mouldings present no real difficulty. It is important, however, that machining speeds should be the highest possible and feeds relatively fine. Further, to produce smooth work and freedom from burrs or distortion, tools must be kept clean and sharp. There is no need to use any cutting fluids in machining these materials. All of them are capable of being polished up bright with greater facility than is the case with the thermosetting varieties, providing proper polishing compounds are employed and only light pressures are used during the polishing operations. Heavy pressure against the buff will cause considerable drag on the surface, and the heat engendered may cause distortion.

It is particularly to be stressed that in tapping operations the tap must not be forced, and preferably should be cleared frequently, as there is a tendency with these materials to build up on cutting edges, causing binding of the tap with the consequent stripping of the threads.

The main considerations governing the use of cellulose acetate mouldings are their relatively cheap price, facility with which they can be obtained, and their adaptability for the production of small parts.

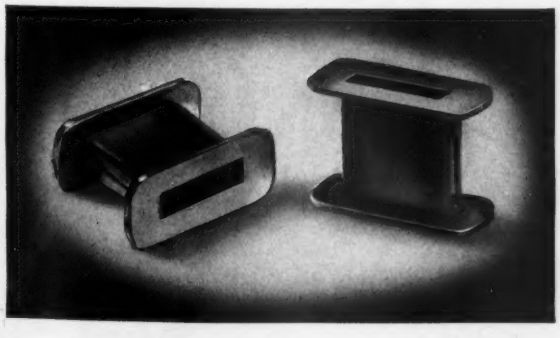


Fig. 1 shows typical acetate spools used for several purposes in the electrical field.

Fig. 2 illustrates two multi-section thin-walled coil bobbins made of styrene resin.

They are particularly useful for thin walled articles which if made from the thermosetting moulding powders would prove to be too brittle to withstand the stresses involved in service or handling. Cellulose acetate mouldings are relatively flexible and therefore are excellent for use as small bobbins having thin cheeks. Fig. No. 1 is a photograph of a typical class of small acetate spool, the thin cheeks of which adequately withstand the outward pressure of the winding. Also, acetate is useful for many mouldings which may require subsequent machining, for example, such as demand knurling. Cellulose acetate is to be preferred to thermosetting plastics as it is possible to produce a deep, sharply defined knurl on this material. On the other hand, if mouldings have to be subjected to continual and constant heavy pressure, then the mouldings will gradually distort.

Styrene mouldings are excellent for use when brilliant glass-clear articles are required. Mouldings of this character are lustrous and exceedingly pleasing in appearance, the ultimate finish, of course, depending upon the excellence of the polish given to the mould. Apart from artistic requirements, the styrene mouldings are unsurpassed so far as plastic mouldings are concerned by virtue of their excellent characteristics in short-wave applications. Selection of these mouldings will obviously be made when water absorption and low loss characteristics are essential, and where heat encountered in service is within the capacity of the mouldings to withstand. Their stability and permanence render them extremely useful material. Fig. No. 2 is a photographic reproduction of a complicated multi-section, thin-walled coil bobbin and it clearly demonstrates the moulding possibilities of the styrenes.

The acrylic mouldings form an intermediate group between cellulose acetate and the styrene groups, and can be used where the conditions of service do not demand such low water absorption or power factor values as exhibited by the styrene group. In artistic applications where appearance and colour shade are matters of real importance they are particularly satisfactory. They are considerably in advance of the cellulose acetate mouldings with regard to permanency of dimensions, resistance to mechanical pressure and general characteristics. Thin-walled articles and articles of very intricate configuration can be produced from them, and are, in fact, finding several important applications in the electrical industry.

Perspex Travels First Class

In the L.N.E.R.'s latest and fastest express, the "Flying Scotsman," the furnishing throughout the train is in a most modern and comfortable style. An entirely new departure is seen in the first-class dining saloon, where light metal partitions separating the six-seat sections are panelled in $\frac{3}{16}$-in. sheets of Perspex, the famous I.C.I. transparent synthetic resin. The photograph reproduced below gives a good idea of the ultra-transparency of the material and the unobstructed view now possible throughout the length of the saloon. The use of such panels ensures complete safety and freedom from dangerous splinters.

Ideas—

By the EDITOR

Fluorescent Acetate

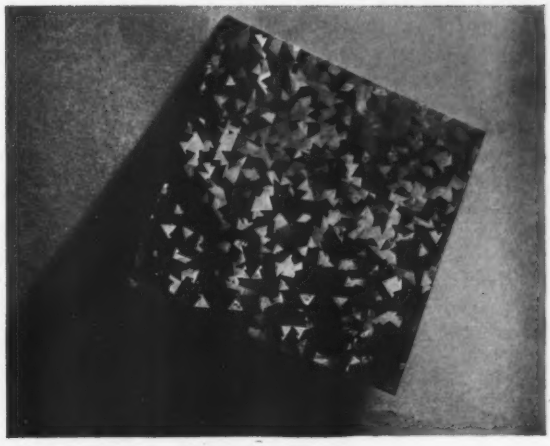
Some short time ago, I mentioned the advent of a new type of Rhodoid, the cellulose acetate marketed in this country by May and Baker, Ltd. This material is manufactured with addition of certain chemicals or dyes which under the action of ultra-violet light gives forth fluorescent light, which makes it extremely attractive for advertisement purposes and

window dressing generally. The attached photograph shows a worthy effort in this direction in the form of foliage. Fluorescent reds, yellows, blues and greens are readily available.

New Acetate Design

It is not often that the scientist, as chemist or physicist, helps to produce a new design in plastics, but this has certainly been the case in a new cellulose acetate brought out by Erinoid, Ltd.

The attached photograph gives a good idea, although merely in black and white, of what the new material is. At certain angles a beautiful iridescence appears with all the colours of the rainbow. The effect is not a result of colour at all, but merely of the design on the surface. This design is, in reality, a hatching of thousands of fine lines impressed



into the surface, each line catching the sunlight and splitting it up into the colours of the rainbow. Actually, it is similar to the physicist's refraction grating, from which no doubt the idea was first obtained. Incidentally, Swan and Edgar's, of Piccadilly, are using such sheet for decorative purposes.

Display Units

There is an obvious advantage in displaying as many units of a particular commodity in as small a compass as possible. Yet the display must be attractive and not crowded. The unit I show here, therefore, is of particular interest and most ingenious in design. It takes up little room on a druggist's counter and individual tubes of Vitalis can be removed for sale with-

out spoiling the appearance of the display to the customer. The example has been kindly sent to us by General Plastics Incorporated, from whose Durez resin the stand was moulded.

Viscose Sheeting

The use of the "Cellophane" type of material seems to be growing every day for packing and similar purposes. One of the latest of these is the wrapping of furniture in stores. I note there are some chairs in the window of Leander's in Lower Regent Street thus covered. There is no doubt that a real saving of money is made by its use, for I have known expensively tapestried furniture to be sold as shop-soiled after a period in a shop window. Even in the so-called hermetically sealed windows dirt gets in and makes the material very grubby.

A step farther was taken by the manageress of a hat shop I entered recently in Paris. Here all the chairs were covered in the material. It shows the texture of the material beneath perfectly and is easy to keep clean. The manageress told me that she is sure it will save money and trouble, and that because of its strength she has changed it only once in five months. It enhances, too, the appearance of the chair, the customer preferring to sit in one that always looks spotlessly clean. Needless to say the fabric beneath is never worn out and retains its smart and fresh appearance indefinitely.

Plastic Mascots

It seems a pity that certain workers in plastics, especially those who fabricate from thick acetate-sheet cast resin, or "acrylic" resin sheet, do not seem to have concerned themselves with the motor trade or, rather, that particular section of it which deals with "mascots." On the whole, existing examples are very poor and almost invariably of metal. The only exception I know is the torpedo design on American cars, which has been cut from transparent red Catalin. Surely there is plenty of scope here? Every motorcar owner would like one, in a beautiful transparent-coloured material instead of the very costly metal kind, which deteriorates rapidly. When the silver plate wears off, exposing the base metal beneath, the result is very unsightly.

I think it only wants initiative and artistic perception, for thousands of beautiful designs are ready to hand. A streamline effect is preferred, but it is not at all essential if properly designed, as the "Boy and Swan" design seen below shows. Nickless, the well-known artist, has kindly made these very excellent suggestions for me. He has captured the "feel" of this type of plastics very successfully.

PLASTIC MASCOTS FOR 1939?

Here are a few suggestions for motor-car manufacturers to embellish their 1939 production.

Plastic Curiosities

By H. Courtney Bryson

I CAN recollect with a certain amount of pleasure mingled with regret my first entry into the plastics world many years ago. At that time the word plastics conveyed to me little more than it does to the man in the street to-day, but in an ancient book of recipes which I bought second-hand I discovered a formula for making billiard balls from potatoes. I had, I remember, just finished reading that remarkable treatise known as the "Discovery of Witchcraft," by Reginald Scot. Therefore I was not at all disposed to question that with the aid of science, which I then knew with absolute certainty to be the most powerful thing in the world when properly controlled, the controller in this case being myself, potatoes could, with the greatest of ease, be transformed into billiard balls. Not only was it easy, it was self-evident. Sulphuric acid entered into the process—large quantities of it. The eventual result, for you must know that some days were required for this subtle alchemy, was, strange to relate, both white and hard, but I am now definitely of the opinion that the proper function of a potato is to be transformed into an Irish stew and not into a billiard ball.

It was not till many years after that I made my next plastics curiosity.

It is well known among plastics experts that the ratio of formaldehyde to phenol during the manufacture of phenol resin exerts a profound influence on the final result. In general, the lower the percentage of formalin the softer and more rubbery the resin and the greater the amount of formalin the harder and more brittle the product. It was while investigating this phenomenon that I made a resin with an excess of formaldehyde which was first heated under pressure and then cured slowly to 140 degrees C. in an open oven. The shrinkage combined with the relative inelasticity of the resin resulted in the production of a series of scale-like fissures in the interior of the transparent block. The thickness of these fissures was sufficiently small to be comparable with the wave length of light. Consequently, interference occurred which lit up the interior with rainbow hues.

It was while trying to extrude a similar kind of resin I developed the following idea which is very suitable for sale in chain stores. A ⌐¬ shaped section plastic is extruded in black or any other colour. This is broken or cut into strips. Four of these strips are used to surround a picture with the usual glass and backing, the ends of each roughly touching. An L-shaped moulding in the same or another colour is then forced tightly over each corner, clamping the ends of the extruded strips in the same way that the strips clamp the glass and picture and holding the whole picture firmly together. The L-shaped moulding serves at once as an ornamental corner and hides the rough ends of the strips.

A moulding powder made with cork instead of a wood flour revealed a further most interesting application of synthetic phenol resins.

For a certain large moulding it was necessary to surround a big iron insert with some insulation of greatly assorted thickness. I therefore dipped the iron insert into a mixture of cork dust and liquid phenol resin in order to make a cushion and so inhibit the cracking which invariably occurs if a straightforward moulding is attempted. It was then that I discovered that this mixture sticks to iron after pressing with a tenacity for which it is difficult to find any descriptive adjective sufficiently strong. The mixture of cork and resin cannot, of course, be moulded alone in steel moulds since, once pressed, not only would it be impossible to extract the moulding, it would be impossible to open the tool.

If it is desired to make a really cheap moulding material, the following may be interesting. It is always stated that ordinary lactic casein cannot be moulded. I have in my possession a moulding I produced over ten years ago from a powder made of 90 mesh lactic casein containing a little paraformaldehyde and 10 per cent. of wood flour. It has been in the bottom of a box which stood in a damp cupboard where some leather on top of it rotted away, but it is still as good as the day it was made. If something still less expensive is wanted then it would be difficult, if not impossible, to find anything much cheaper than sand-sulphur mouldings.

Sulphur is plentiful and cheap. It exists in a number of different forms, of which the most interesting is that known as plastic sulphur. When ordinary sulphur is heated it first melts to a thin liquid. If the heating is continued up to 200 degrees C., the liquid thickens and loses all its crystalline characteristics, and finally becomes a plastic rubbery dough. A number of technical and commercial uses could be found for this plastic sulphur, but, unfortunately, on standing it slowly reverts to the brittle condition.

Sand, too, is cheap and plentiful. A heated mixture of sand and sulphur may be readily cast in cheap bronze or glass moulds to give accurate articles possessing a smooth, pleasing surface. The process has a number of advantages. It is very cheap and simple. The minimum amount of plant is required and the moulds are quick as well as cheap to make. Large articles may be made as readily as small, and most colours are readily obtainable. The articles are dense though the pressure required for moulding is small. The best proportions consist of about equal parts of sulphur and sand. If the sand is suitably graded a tensile strength of 650 lb./in.^{2} is obtainable and this is increased by the incorporation of 5 per cent. of carbon black. In producing mouldings from phenol resins the article in general is so designed as to be as thin as possible consistent with the required strength. This is done in order to save material which costs at the lowest ½d. oz. Such articles are of necessity light in weight. This is not always an advantage. Given two inkstands, say, of identical design, one made from moulded phenol resin, one made from the sand-sulphur mixture described above, the average buyer chooses the latter because it is heavier.

An entirely inorganic material was utilized in one of the most spectacular moulding processes ever

(Continued on p. 280)

PRODUCTION

Practical Information dealing with Raw Materials, Moulding and Forming of all types of Plastics—Thermo-Hardening and Thermo-Plastic—Works-Organization, New Plant and Control Apparatus

NOTES AND COMMENTS

Plastics from Potatoes

ENERGETIC steps have been taken to oppose the proposals under which the Potato Marketing Board would be allowed to manufacture certain chemicals and plastics from them.

In July an inquiry at the High Court, London, was held, Mr. J. Davidson Pratt representing the Association of British Chemical Manufacturers, Bakelite Ltd., British Industrial Plastics, Ltd., and the British Plastics Federation, Ltd., putting forward the objections to such a proposal. He said that a formal objection had been made by the A.B.C.M. to the granting of powers sought by the Potato Marketing Board to make alcohol organic chemicals and plastic and synthetic resins for use in the moulding, varnish and paint industries.

The Potato Marketing Board was in effect, he said, a semi-State organization with monopolistic powers which enabled it to meet any losses which might occur from the proposed activities in manufacturing, from the fund it could create from levies on its members, and from profits made on the sale of potatoes, thus enabling it to compete unfairly with established industry.

Mr. Pratt's argument showed that the existing chemical industry was very efficient, was able to meet all requirements, that additional production would be at the expense of existing concerns, and that production of alcohol, and, therefore, products made from it, would be uneconomic because the suggested manufactures would be based on surplus potatoes. Such surplus would be variable and erratic, and factories would be unable to work at a steady, economic load.

It was important to point out, too, that in Holland the trials which were there undertaken to obtain alcohol from surplus potatoes had been abandoned. From Eire comes the news that the potato alcohol factories are closed down until next October, when they will be restarted and molasses used when potatoes are not available.

With regard to plastics, Mr. Pratt said that little was known of plastics made directly or indirectly from potatoes. If the Potato Marketing Board had developed or had knowledge of direct methods of production, the plastics industry would be glad to put its wide experience at the Board's disposal, to advise the Board as to the commercial feasibility of these new processes, and to co-operate in their development, if such could be shown to be economic. What had been said regarding organic chemical products applied with equal force in the field of plastics. The industry was extremely competitive because of the variety of types of plastics. It was very specialized, highly efficient, maintained active research organizations, and had adequate capacity to meet all present and anticipated demands. It would be better for the Potato Marketing Board to wait until the situation arose, when the matter could be examined in the clear light of all the facts, and then the necessary additional powers would be granted if it was considered to be justified in the interests of all concerned.

In conclusion, Mr. Pratt said that if surplus material were available its use should be left to established industries working in co-operation with the Board, so that dislocation of the markets would be avoided. The industries he represented would be prepared to help.

No Restrictions on Celluloid

THE Committee set up last year to inquire into the use of celluloid in the production of toys and certain fancy goods has now published its report, on sale by H.M. Stationery Office at the price of 9d.

The result of the inquiry shows adequately how low is the incidence of fire due to celluloid burning. Information from one fire insurance office shows that of its record of 4,000 fires in private houses only two could be traced to celluloid. One of these was caused by a celluloid toy, the claim being for under £2 only. The other was caused by the bouncing into a fire of a table-tennis ball.

Statistics of fires in the London Fire Brigade area are illuminating, for, between 1914 and 1936 there were 97,019 fires, of which only 15 were caused by celluloid. Foreign statistics show similar results. As for fatal injuries due to celluloid burning, there were two out of 1,745 child fatalities and one out of 7,691 adult fatalities.

The Committee state that in view of these figures there does not seem sufficient reason to restrict or prohibit the uses to which celluloid is put. It is of the opinion that all celluloid dolls and combs should be conspicuously marked or labelled with the word "Celluloid" so that the public should be made aware that they are buying this material.

All Plastic Window Materials

By P. MABB

GLASS is one of the commonest commodities in both industrial and domestic application where transmission of light is concerned. Its great advantage is its stability under ordinary service conditions, even though the latter embrace wide variations of temperature and humidity. Its abrasion resisting properties are also of great value as it will not readily scratch or mark when subjected to dust and grit impingement or cleansing operations, while it does not stain or deteriorate in any manner by prolonged contact with liquid substances with the possible exception of a few chemical solutions which would be encountered upon only rare and special occasions. Its major disadvantage appertains to impact strength. The ease with which it can be broken not only constitutes a source of annoyance by virtue of the inconvenience and expense of replacement, but also a menace to people by injury and to the functioning of machines or equipment by fouling of moving parts with particles of abrasive. Another shortcoming of prime importance lies with the fact that it is not amenable to ordinary machining operations and is not producible to dimensions and shapes of sufficient accuracy demanded by modern engineering. These drawbacks have long been recognized and many attempts have been made to find a satisfactory substitute. Mica is one of the naturally occurring products that has been able to displace glass in a limited manner, the extent of its use being restricted to sight glasses and heat-resisting windows of small area, and where poor transparency is no great objection. Celluloid, a synthetic plastic of nitro-cellulose base, was one of the first artificial glasses, but this introduced new difficulties from the aspect of inflammability, embrittlement with age, and the ease with which it could be scratched and stained. Cellulose acetate entered next and for a long while was employed unchallenged as a window material in a large number of applications. It still exhibited disadvantages, however. High inflammability as with celluloid was no longer existent, although the material conflagrates once ignited. It ages, although not nearly so markedly as nitro-cellulose base glasses, and it offers no great advantage with respect to resistance to scratching. Chief objection to acetate, however, is the ready manner in which it responds to fluctuations in ambient temperature and humidity, this being reflected in dimensional changes. In consequence, short period exposure to a relatively higher temperature or drier atmosphere may cause windows to shrink and fall out, while subjection to damp conditions promotes expansion with resultant buckling.

More recent developments have seen the commercialization of synthetic plastic sheets which have overcome some of the disadvantages connected with the use of acetate. These newer materials are still organic thermo plastics and therefore by no means entirely eliminate the drawbacks common to plastic materials used for this purpose. Three chief groups claim attention, the polystyrols, the polymethyl methacrylates and the polyvinyl chlorides. These are all available in a range of sheet thicknesses, of good strength including resistance to impact, and of good transparency. They vary in their degrees of water-whiteness, but the polystyrols and methyl methacrylates compare more than favourably with glass, while the polyvinyl chlorides possess a faint greenish brown tinge which becomes more perceptible as the thickness increases.

The whole of the synthetic groups mentioned can readily be machined. Panels can be sawn to size, bevels machined, holes drilled and tapped, while with specialized techniques machined surfaces can be polished to a mirror-like brilliance. At the same time, in carrying out any machining operations care must be exercised to avoid scratching surfaces, as this only adds to the labour of polishing out such blemishes again. Another feature of them all is, on account of their thermoplasticity, the synthetics can be formed to simple shapes of curved contour by pressing warm in appropriately designed tools. The imparting of such shapes to these materials by hot forming does not detract from their strength, or add to their friability.

From the point of view of their thermo-plastic characteristics, the most obvious limitation of the transparent synthetics is that of resistance to elevated temperature. This limitation can for most practical purposes be fixed at 60 degrees C. (140 degrees F.), although small panels may safely withstand slightly higher temperatures than this, while short period exposures to considerably more elevated temperatures may be safe in certain cases. Unlike the cellulose acetate group, the three newer plastics are virtually stable with respect to dimensional movement under damp conditions or even submersion in water. To illustrate the possible movement, test pieces approximately 6 ins. long by 1 in. wide by the thickness of the sheet were accurately measured before and at intervals after subjection to extended water immersion at ordinary temperatures, to extended dry heat at 60 degrees C., and to one of the standard tropical conditions tests incorporating cycles of warm humidity and cold moistures, the cycle comprising 8 hrs. and 16 hrs., respectively.

The results given over page refer to an extended exposure to dry heat at 60 degrees C. The polyvinyl chloride plastics, it will be seen, withstood these conditions very well for a short period, but at the end of the month gave evidence of an abrupt change in physical characteristics, accompanied by a marked change in dimensions. At the end of three months this change was exceedingly large and of such a nature that would prohibit the use of the material for any length of time under comparatively hot conditions. The polymethyl methacrylate material, although giving similar evidence of some slight change, both at the end of one month and of three months' periods of exposure, proved markedly superior, and could be employed with greater confidence. The polystyrol type of material seemed generally to have some slight superiority over the methacrylate type. The material most generally used at the moment for windows on a restricted scale, namely, cellulose acetate, is also included, and this is really inferior to any of the foregoing in showing rapid

response to heat by contraction, this contraction being progressive with time, although it does not show any sudden change after a long period, as evidenced by the polyvinyl chloride plastic.

In the table below is given the results which refer to wet conditions, and it will be seen that upon complete water immersion for extended periods all the new materials are entirely satisfactory with respect to dimensional stability and that the polystyrol shows slight superiority. The cellulose acetate is unsatisfactory in this respect, showing rapid response to the conditions by progressive dimensional increase.

The data given in the same table shows that under combined conditions of varying warmth and varying dampness, some irregular fluctuation can occur, but that in general this will be negligible in the case of the new materials. The polyvinyl chloride materials are not so good as the other two. Methacrylate and polystyrol materials both behave exceedingly well. Cellulose acetate falls in a different class in so far as its movement is appreciable and evident from the early stages of the exposure.

The weight changes corresponding to the dimensional changes in the foregoing tests reveal that the styrol plastics stand out as the most superior with the methacrylate type a very good second. The acetate variety are the poorest by comparison.

The figures given in the table are all total changes, + indicating an increase, and − a decrease. From the point of view of appearance during the tests little change occurred, except with the vinyl chloride which showed some indication of darkening slightly under the heat or warm humidity.

For general purposes, as a substitute for glass, whether for use in the form of small panels or large windows, for registers, instruments or suchlike, or in the form of strip or sheet covering designation labels, drawings, display signs, etc., the methacrylate plastic has all round claims. It is sufficiently suitable dimensionally, it is of exceedingly good clarity, including both transparency and freedom from colour, and it can be quite readily machined to size, or with reasonable skill polished to remove scratches or blemishes without spoiling the material by softening it and causing it to flow. The polystyrol plastics from a general viewpoint would behave similarly, and under very adverse wet conditions would be somewhat superior. The polyvinyl chlorides possess the disadvantages of lack of maximum clarity and stability under extended heat.

In spite of certain advantages possessed by the methacrylate, styrol and vinyl type over cellulose acetate, it must not be forgotten that cellulose acetate has advantages over these three which may be of paramount importance according to the purpose involved. Two advantages, for example, are comparative low cost and comparatively high impact strength.

Material.	Impact Strength.
Cellulose acetate	2 ft.-lb. and over.
Methacrylate type	about 0.3 ft.-lb.
Styrol type	about 0.2 ft.-lb.
Vinyl type	about 0.3-0.6 ft.-lb.

MOVEMENT OF COLOURLESS TRANSPARENT PLASTICS UNDER VARIOUS EXPOSURE CONDITIONS—DIMENSIONAL CHANGES PER CENT.

Sample No.	Material	Dimensions	Extended Exposure to Dry Heat at 60°C.					Water Immersion at 20°C.				Exposure to cycles of 8 hours warm humidity and 16 hours cold damp conditions.			
			6 hrs.	24 hrs.	1 week	1 month	3 months	1 day	1 week	1 month	3 months	1 day	1 week	1 month	3 months
1	0.153" Polyvinyl Chloride	Length	nil	−0.3	−0.6	−5.0	−6.9	nil	nil	nil	nil	−1.2	−1.2	−2.0	−2.5
		Width	nil	nil	nil	nil	nil	nil	nil	nil	nil	+2.0	+2.0	+2.0	+2.0
		Thickness	+0.3	+0.5	+0.6	+6.5	+7.0	nil	nil	+1.0	+3.3	+0.4	+0.3	+0.4	+3.1
2	0.187" Polymethyl Methacrylate	Length	nil	nil	nil	−1.2	−1.2	nil	nil	nil	nil	−0.3	−0.3	−0.3	−0.3
		Width	nil	nil	nil	−2.1	−2.1	nil	nil	nil	nil	nil	nil	nil	nil
		Thickness	+0.2	+0.3	+0.3	+2.7	+3.2	nil	nil	+0.1	+0.4	+0.4	+0.3	+0.4	+0.8
3	0.378" Polystyrol	Length	nil	nil	nil	−0.4	−0.6	nil	nil	nil	nil	nil	nil	−0.3	−0.3
		Width	nil	nil	nil	−0.6	−0.7	nil	nil	nil	nil	nil	nil	nil	nil
		Thickness	nil	−0.7	−0.8	−0.9	−0.9	nil	nil	nil	nil	nil	nil	+0.2	+0.3
4	0.312" Cellulose Acetate	Length	−0.5	−0.8	−1.1	−1.6	−2.0	+0.5	+0.6	+0.7	+0.9	−0.4	−0.7	−0.9	−1.0
		Width	−0.4	−0.6	−0.8	−1.2	−1.5	+1.0	+1.2	+1.8	+2.3	+0.6	+0.8	+0.9	+1.0
		Thickness	−0.9	−1.1	−1.3	−2.2	−2.7	+0.9	+1.4	+2.0	+2.5	+0.7	+1.0	+1.4	+1.7

PLASTIC CURIOSITIES

(Continued from page 277)

developed. A French firm for many years specialized in the moulding of fused basalt. Basalt is a hard igneous black (or dark grey) rock occurring in the ancient trap and the recent volcanic series. It is plentiful, and therefore cheap, and often occurs in regularly prismatic columns, of which Fingal's Cave in Staffa and Giant's Causeway in North Ireland are well-known examples. It is strong and tough, has a very high melting point and a good dielectric strength. The remarkable mouldings which were produced at Ivry, near Paris, were made at a very high temperature actually from the fused basalt, and had an excellent black vitreous lustre.

In the craze for the development of new plastics, the exploitation of the old is often overlooked. Plaster of Paris possesses the enormous advantages of very low price combined with a facility for readily being cast into the most intricate of shapes, qualities not shared by any other material. Furthermore, unlike moulded products, the cost of an article does not increase out of all proportion to the size. Plaster of Paris, however, suffers from lack of water resistance and low strength. These defects may be overcome by impregnation with a low viscosity liquid phenol resin. I have carried out a number of experiments on these lines, developing a special impregnating resin which, when cured at a low pressure in the plaster, gives a glossy waterproof product with high cross-break and tensile strength. The best amount of resin to use appears to be about 33 per cent. on the plaster.

Inquiries and Answers

New Acetate Containers

Bedford.

To the Editor, *Plastics*.

Dear Sir,—I am requiring a plastic material in sheet form, say .01 in. thick or less, as an experimental covering for small cardboard fancy shaped containers. The material should be of a nature so that it may be cut on a box maker's shears or with strong scissors, should bend readily and, if possible, should be capable of making a right angle having a fairly sharp corner.

In addition, other sheets upwards of 3-16 in. thick would be required for decorative purposes only. The thin sheets would have to adhere to ordinary strawboard with animal glue or some other adhesive readily obtainable. The trimming pieces will be attached to the above by similar means and must be bendable. I should be glad of your advice as to which firm or firms amongst your advertisers is best likely to meet these requirements. L.H.

[EDITOR'S NOTE.—The material you require is readily available in the form of cellulose acetate and in the thicknesses you mention. It can be easily cut in shapes with shears or knife and is capable of making a robust right angle with sharp corners. Manufacturers usually sell a special cement since animal glue is not considered satisfactory. We recently published a photograph showing a transparent box of acetate with right angles having sharp corners and a lap-welded joint. Well-known companies dealing with this type of sheet are:—British Xylonite Co., Ltd., Hale End, London, E.4; Erinoid, Ltd., Lightpill Mills, Stroud, Gloucester; British Celanese, Ltd., Hanover Square, London, W.1; Collcetone, Ltd., 15-16, New Burlington Street, W.1; F. A. Hughes and Co., Ltd., Abbey House, Baker Street, London, N.W.1; May and Baker, Ltd., 42-43, St. Paul's Churchyard, London, E.C.4.]

Luminous Plastics

Leeds.

To the Editor, *Plastics*.

Dear Sir,—May I, as one of your humble readers, correct a statement made by you in your "Ideas" page of June, i.e., that there is not available a luminous powder for moulding, as I have myself moulded with such a powder. (As proof, I enclose a sample, which please return.) The powder is, I was told, a French product and very expensive. The firm I worked for had received a sample with which they experimented, the idea being to make luminous wall switches. Whether this has been carried out any further I cannot say, as I am not now employed by them. I find that the lid gains in power if held up to electric light. It is, by the way, an impression from a mould intended for cream pots, so that they may be visible at night on the dressing-table.

[EDITOR'S NOTE.—We did not wish to give the impression that no luminous moulding powders are available, but that May and Baker have no luminous cellulose acetate powder available yet. In our October, 1937, issue, page 162, we gave publicity to the luminous moulding powders produced by the Société des Produits Luminescent, 24, Rue Vernet, Paris, and of Sobelrecol, 66, Avenue de l'Observatoire, Liége, Belgium.]

Plastics for Deodorizing Blocks

Wells.

To the Editor, *Plastics*.

Dear Sir,—Do you consider that it would be practicable to mould perforated containers for deodorizing blocks which find an extensive use in hotels, schools, hospitals and other institutions? K.M.

[EDITOR'S NOTE.—Although we have no actual experience of such containers we are sure they can be moulded from ordinary moulding powders. If the block is made simply from naphthalene there is no attack on the moulded container. Neither does there appear to be a possibility of corrosion if the block contains para-dichlorbenzene which is now widely used, even though small traces of free chlorine were present. Small containers could be made by injection from thermo-plastics.]

Machining Laminated Fabric

Mansfield.

To the Editor, *Plastics*.

Dear Sir,—I shall be obliged if you will tell me if impregnated fabric such as Novotext and similar material, like Tufnol, can be machined on a lathe in the same way as metal.

[EDITOR'S NOTE.—The materials you mention can be machined without encountering any serious difficulties provided the precautions advised by the manufacturers of the materials are taken. The following points mentioned in the Tufnol booklet should be borne in mind:—

(1) Tools must be sharp. If the Tufnol changes colour during machining it is due to burning taking place—the sign of a dull tool.

(2) Special tools should be reserved for working Tufnol. This is particularly important when the Tufnol is to be used for electrical purposes, as any particles of metal which might be present on a metal-working tool would become embedded in the Tufnol and impair its electrical insulating properties. By keeping special tools, it is also possible to take advantage of the most suitable degrees for the set of the tools described in the booklet.

In the case of Novotext, this can be machined, and the methods adopted in planing, turning, boring and milling do not differ widely from the methods in everyday use. The depth of cut must be small (0.3 to 0.5 mm. = 0.118 to 0.196 in.), and a cutting speed of 0.5 to 1.0 m. per sec. (19.5 to 39 ins.) is specially suitable. No cutting lubricant must be used on any account.]

Moulded Soap Dispensers

Chesterfield.

To the Editor, *Plastics*.

Dear Sir,—I am interested in the application of plastics in the sanitary goods field, particularly moulded liquid soap dispensers. Is there any fear of the ingredients of the liquid soap corroding the plastic material?

[EDITOR'S NOTE.—We think there is no risk of the moulding being attacked by a *neutral* soap which contains glycerine, alcohol and such additions as pine oil and various perfumes. Several well-known moulders have experience of moulding soap dispensers, and we recommend you to get in touch with Messrs. Crystalate, Ltd., H. E. Ashdown (Birmingham), Ltd., Prestware, Ltd., British Xylonite Co., Ltd.]

TRADE AND PERSONAL NOTES

Frank Murphy, Ltd.

Mr. Frank Murphy, whose portrait is so familiar to the public because of his previous association with one of the best-known radio sets, has now formed a company at Welwyn Garden City to make good furniture, this being defined as useful and durable furniture having a good value-for-money ratio. It is proposed in the first instance to serve the income group £350 to £500 per annum, and then systematically to add income groups on each side of this until the whole income range is covered.

The point of interest to the plastics industry is that Frank Murphy, Ltd., are anxious to make use of mouldings, etc., provided, of course, that these materials will meet all their requirements. Mr. Murphy states that the price policy equally affects the materials to be employed in giving a desired result. For example, for strength either wood, plastics or steel might be employed in making a table. With present-day prices and technique, wood is still the most economical, with plastics as the runner-up.

To make practical and economical Mr. Murphy's "New Conception of Business" he is seeking the co-operation of the plastics industry, and desires to make immediate contact with firms making moulding powders, also makers of semi-finished and finished products, the latter presumably being moulded furniture.

Mr. George Kamen, general manager of Walt Disney-Mickey Mouse, Ltd., has resigned, and, pending the appointment of his successor, the London offices will be in charge of Mr. E. J. Davis, assistant manager, in conjunction with Mr. William B. Levy, general European representative for all Walt Disney enterprises.

The "Beeantee" Illumination, Ltd., 88, Goswell Road, London, E.C.1, have issued a folder containing details of new weatherproof electric light fittings made of Bakelite.

Bakelite, Ltd., held their annual sports day on July 23, and it was made the occasion for the opening of a new 10-acre sports ground and pavilion by Mr. H. V. Potter, the managing director. The 30-acre site at Tyseley, on which the works of Bakelite, Ltd., were built originally, provided ample space both for the factory building and sports facilities, but the consistent growth of the company has necessitated a steady encroachment on the sports fields. As a consequence, the company acquired a new site for the sports ground at Elmdon, 10 miles from the heart of Birmingham and situated amidst lovely country. Mr. Potter, performing the ceremony, pointed out that the company was pleased to provide sports facilities, but had no desire to organize the private lives of employees. The company would continue to encourage interest in sport and physical fitness, but the sports club would remain independent.

His Majesty's Trade Commissioner at Johannesburg reports that the Union Tender and Supplies Board, Pretoria, is calling for tenders (Tender No. 652) for the supply and delivery of quantities of telephone apparatus comprising magneto extension switches, central battery switchboards (private branch exchange), cordless type, and magneto switchboards, cordless types. Tenders, endorsed "Tender No. 652 Post Office," should be addressed to the Secretary, Union Tender and Supplies Board, 271, Visagie Street, P.O. Box 371, Pretoria, by whom they will be received up to 9 a.m. on Thursday, September 1, 1938.

The British Thermostat Co., Ltd., have sent us a copy of "Thermochat," the official organ of the company's very enthusiastic social and sports club. Judging from the amusing account of the day's outing at Ramsgate and Margate, we should imagine that Saturday, June 25, will not easily be forgotten.

Major F. A. Freeth, O.B.E., D.Sc., Ph.D., F.R.S., who has been research manager of Imperial Chemical Industries since the formation of the company in 1926, is retiring from that position, but has consented to continue his connection with the company in the capacity of consultant.

The Leipzig Autumn Fair will open on August 28, 1938. Next to the Leipzig Spring Fair it is the greatest market in the world for manufactured goods. Approximately 6,000 exhibitors will show their latest novelties, and the plastics industry will be well represented. Special travelling facilities are granted by the authorities.

British Industrial Plastics, Ltd., have just sent us the summer number of their well-produced house journal "The Beetle Magazine," which contains a number of most interesting articles and illustrations. On page 19 of the magazine is reproduced the main part of Mr. Dingley's excellent contribution to the debate on "What We Think of the Designer," held on April 21, 1938, at the Building Centre, New Bond Street, London. Incidentally, this debate was fully reported in *Plastics*, June, 1938.

The Departmental Committee on the **Use of Celluloid** made the following recommendation in a report published July 19, 1938:—

Prohibition of the sale to the general public of cuffs, collars, shirt fronts, side combs, and hair ornaments, consisting wholly or mainly of celluloid.

No person should be permitted to sell or hire any toy cinematograph or optical projecting or viewing apparatus in which artificial light is used so constructed as to be capable of use with cinematograph film of a greater width than 20 millimetres.

Prohibition of the sale or hire to the general public of nitro-cellulose film of any width for projection through any cinematograph or viewing apparatus; this prohibition to apply to finished films.

All celluloid dressing or toilet combs and dolls should be conspicuously labelled or marked "Celluloid."

"The balance of evidence," states the Committee, "has led us to the conclusion that, at the present time, there is no other plastic material that possesses all the desirable properties of celluloid."

Crystalate, Ltd., show a profit for the year ended March 31, 1938, of £2,240, compared with the total of £2,326 secured in the preceding period of 14 months. The directors report that while the wholesale section of the business has been adversely affected by the general recession in trade, the moulding department, which is the company's principal activity, is working to capacity. That satisfactory position will encourage shareholders to look for a continuance of the recovery in the current year.

Dixon Plastics, Ltd., is a private company, registered July 14. Capital £2,000 in 2,000 shares of £1 each. Objects: To acquire the business of the P. H. Dixon Plastics Co., of Earls Barton, and to carry on the business of manufacturers of and wholesale and retail dealers in plastics, manufacturers of cellulose acetate, synthetic resins, pigments, compositions, oils, etc.

R. **Leech, Ltd., Altrincham,** have taken over the agencies formerly held by E. R. Meade, Ltd., and have also purchased their entire stock and records.

Samson Clark and Co., Ltd., have sent us another of their fascinating bulletins, this time dealing with the radio industry. One of the most significant statements in this publication is the following:—

"The British radio industry, according to all indications, is now in the second phase. Production during the past two or three years shows all the 'earmarks' of this stage, with recessions quite as common as advances. Following this period of what may be called 'deferred action,' radio would, in the usual way, be expected to pass into the permanent or replacement phase. In it, growth depends largely on the normal growth of population, or on rises in the national standard of living. But before radio could reach the 'replacement' phase on the market, a new factor has arisen—television.

"While television is inseparable from radio and has greatly widened the marketing horizon, it has in a very definite way placed the strictly radio business back where it was years ago. Consequently, radio will never attain the replacement market it otherwise would have enjoyed had television not been discovered. Based on a saturation point of roughly 10,000,000 receiving sets, a permanent replacement market of 2,000,000 a year in Great Britain would have appeared normal, taking a five-year life for the apparatus. People to-day who otherwise would replace their old sets by new ones are likely to wait and see what television is going to do. The future radio replacement will, therefore, be a combination of radio and television apparatus, until radio is, at length, superseded."

E. K. Cole, Ltd., the well-known manufacturers of the Ekco radio set, are developing other sides of business to offset possible fluctuations in radio sales during the next few years. Their moulding department is well organized and, in addition to making the Thermovent and other large pieces, we understand that the company is now making precision and scientific instruments and will shortly be going into the household appliance field with a new Canadian washing machine.

A.E.G. Electric Co., Ltd., have sent us a brochure describing their Novotext material, which is finding so many uses in the engineering and electrical fields.

Institution of the Rubber Industry, 12, Whitehall, S.W.1, inform us that "The Proceedings of the Rubber Technology Conference," London, May 23-25, 1938, is now in preparation. This volume will contain over 1,000 quarto pages, comprising the 103 scientific and technical papers read at the Conference and the important discussions that followed. The Council decided to offer this volume at the low price of £1 11s. 6d. until July 1st and after that date at the publication price of £2 2s. The widespread interest in the conference is well illustrated by the fact that 89 organizations, representing 16 different countries, sent official delegates and the Conference was attended by nearly 500 members from all parts of the world. The present volume may well be said to represent the foreground of advanced thought in science and general technology of rubber.

Mollart Engineering Co., Ltd., Kingston By-pass, Surrey, have now entered the plastics industry and are at present engaged on Air Ministry work. Mr. F. W. Smith, late of the Hadley Co., Ltd., is the technical director in charge of the new department, which, he informs us, is in full production and able to cope with all work in thermoplastics, such as cellulose acetate and Mipolam, the latter material being preferred for work requiring non-absorbent mouldings.

Albert Products, Ltd., Erith, Kent, have sent us a useful booklet giving full information about their Alprokyd resins 626L and 525V, which are finding many important uses in the paint, varnish and allied industries.

National Safety First Association recently called a meeting which was attended by both makers and users of safety equipment as well as by representatives from employers' organizations, engineering institutions and other bodies. A resolution was carried asking the General Council to set up a representative Industry Committee to deal with all personal safety equipment.

Imperial Chemical Industries. Ltd., announce that adequate supplies of Neoprene are now available, and they can assure their customers that regular stocks and supplies will be maintained in the future.

Boonton Molding Company, U.S.A., have sent us a copy of their "Ready Reference for Plastics" which is a most useful brochure giving data about all the most important plastic materials, both thermo-setting and thermo-plastic. We should imagine that moulders would find this publication of considerable interest, especially as all the chemical and physical properties of plastics are given.

Nuckey, Scott and Co., Warrior Works, Compton Avenue, London, N.1, have asked us to announce that their specially designed cast-steel cut thread taps for use on Bakelite and other plastic materials will in future be known as Warrior "Plastic" Taps, obtainable from all tool suppliers or direct from the makers at the above address.

Evered and Co., Ltd., Surrey Works, Smethwick, have sent us a folder describing their plastic door handles made of Everite plastic material, and we advise all our architect and hardware trade readers to send for a copy.

Thomas De La Rue and Co., Ltd., held their 41st annual general meeting at River Plate House, Finsbury, London, on July 14, 1938. Mr. S. S. Lamert, the chairman of the company, was in the chair and stated that the profit of £185,452 for the year ended March, 1938, compared very favourably with the figure for the previous year of £51,121. He mentioned that the plastic side of the company had grown very considerably during the past year.

J. E. Snow (Plastics), Ltd., have formed a new company with a capital of £5,000 in £1 shares. The address of the company is 72, Arundel Street, Sheffield.

Industrial Insulators, Ltd., is a new company formed to carry on the business of manufacturers of and dealers in insulating tapes and fabrics, rubber goods, ebonite, vulcanite and other plastic substances. Capital is £1,000 in £1 shares and the registered office is at Bush Lane House, Cannon Street, E.C.4.

Low Temperature Carbonization, Ltd. Sales last year showed an increase and trading profit was £116,683. After providing for debenture interest and other charges there remained £67,737, which, added to the total brought forward, amounted to £78,886.

Bakelite, Ltd. have forwarded us their new sample booklet relating to decorative veneers, which contains a number of coloured specimens with glossy and satin surfaces. Apart from the plain colours, these veneers are also available in patterned and woodgrain finishes. Two standard sizes of sheet are made, 100 ins. x 50 ins. and 84 ins. x 36 ins. and sheets of smaller dimensions are cut from these sizes. For veneering purposes they are made in standard thicknesses of 3-64 in. and are sanded on the back in order to assist adhesion to the sub-face. Copies of this useful booklet will be forwarded by Bakelite, Ltd., free of charge to any persons concerned with interior design work or architectural decorative schemes generally.

Laminated Wood Products, Ltd., is to hold an extraordinary meeting of shareholders on August 18, at the Phœnix Room, Holborn Restaurant, for the purpose of passing a special resolution that the company be wound up voluntarily and that Mr. Douglas Frank Lumley, incorporated accountant, be appointed liquidator. In February last the company's assets were acquired by Saro Laminated Wood Products Co., Ltd.

NEW MATERIALS—NEW PLANT—NEW METHODS

British Xylonite Co., Ltd., Hale End, London, E.4, have just published a most attractive little book describing their Bexoid injection powders and they justly claim that it is one of the most ambitious and colourful trade brochures so far issued by any plastic firm. The photographs are clear and self explanatory, and the letterpress designed to be of the maximum assistance to firms interested in injection moulding. It is explained that Bexoid moulding powder will be found to flow readily without the use of excessive temperatures, and set rapidly in the moulds, producing strong, rigid mouldings. In order to meet varying requirements in moulding properties, Bexoid moulding powder is made in three degrees of plasticity, requiring different moulding temperatures. The approximate moulding temperatures of these different grades are as follow:—

Soft Flow ...	145-155°	Centigrade
Medium Flow	160-170°	,,
Hard Flow...	175-185°	,,

For most injection moulding purposes, medium-flow material will be found the most suitable. Hard-flow material should be chosen for special cases where high heat resistance and freedom from distortion are required under severe working conditions. Special grades of Bexoid moulding material can often be produced to meet particular specifications.

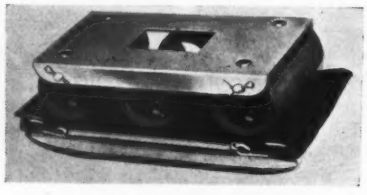
Chicago Metal Hose Corporation, Illinois, U.S.A., are manufacturers of one of the best-known flexible metal steam connections for platen presses which are sold under the name of Rex-Weld. A feature of these is that they are all available in one-piece construction, which requires no packing and no tightening. Full particulars are given in a leaflet issued by the company.

Torrance and Sons, Ltd., Bristol, have forwarded us a copy of their latest trade booklet dealing with their machinery for the production of rubber, paints, printing inks, etc. This publication is of interest to the rubber and plastic industries because many of Torrance's mixing and grinding machines find use in the two trades. All the company's mills and mixers are fully illustrated and described.

Flexrock Company, Philadelphia, Pa., have sent us a leaflet describing their various products suitable for repairing and resurfacing concrete floors—particularly factory floors.

The Speed-Bloc Sander

Increased profits are to-day only obtainable by cutting labour costs to a minimum without any accompanying loss in efficiency. Sterling Speed-Bloc Sander replaces hand operation in the sanding of finishing mouldings and all types of plastics. The machine operates efficiently on 60 lb. of air, using approximately 6 cubic ft. per minute under load. Motor speed and required air pressure are approximately 3,000 complete oscillations per minute with $\frac{5}{8}$ in. travel of the sanding pad. Due to the unusual and unique



The Speed-Bloc Sander.

patented construction of the rubber-composition sanding pad, it is extremely flexible, thus permitting the sanding of curved as well as flat surfaces. It is equally adaptable to small parts or large pieces. The dimensions of the machine are only 7 ins. long, $4\frac{3}{4}$ ins. high and $3\frac{3}{4}$ ins. wide, and this means that it is exceptionally easy to fit into the palm of the hand and to guide over any required surface. One to six pieces of abrasive paper or cloth may be applied at one loading. As each piece becomes worn, the operator tears it off. No special size of paper is required. A standard sheet is cut in three pieces, each $3\frac{3}{4}$ ins. by 9 ins.

Crompton Parkinson, Ltd., London, have sent us a well-illustrated brochure describing the methods, materials and equipment used for the system of standardized production at the company's Guiseley works, where, it is stated, one motor is produced every four minutes. No one who has read this interesting brochure can help but admire the remarkable organization responsible for one of the most reliable motors on the market to-day.

George Gorton Machine Co., U.S.A., have now added a cutter-grinder to their range of machines for the plastics industry. The grinder, known as 375-2, is designed particularly for grinding the highly efficient time and money-saving single flute cutters, which cannot be ground properly on the standard type of cutter grinders. It will also grind other types of small cutters, not over $\frac{5}{8}$-in. shank, used in die and mould cutting and pantograph engraving and profiling work. This cutter-grinder has been built with all bearings dustproof and running in oil. Simple positive adjustments for wear are provided at vital points.

A. Reyrolle and Co., Ltd., have available literature of interest to trade readers on various aspects of switchgear and transmission work.

Brooks Motors, Ltd., Huddersfield, are able to offer the trade an interesting scheme for replacing existing motors which do not comply with the regulations of the new Factories Act. A generous discount off a new motor is offered in exchange for any existing motor up to 20 years old. The firm will also convert any existing motor to comply with the Factories Act.

British Commercial Gas Association, 1, Grosvenor Place, S.W.1, give a number of applications of gas in various types of factories in their latest publication entitled "Industrial Uses of Gas," which is No. 11 of the series.

Rhodes, Brydon and Youatt, Ltd., Stockport, the well-known manufacturers of the Mopump, describe their product very fully in a new illustrated list just issued to the trade.

James Howden and Co. (Land), Ltd., are responsible for a handsomely produced brochure dealing comprehensively with heavy-duty fans, which may be obtained on application.

Bakelite, Ltd., are making good progress with their new type of adhesive for the gluing of plies in the manufacture of plywood. It is known as Bakelite Plybond, and takes the form of a thin sheet of paper which has been specially impregnated with Bakelite resinoid.

Wahlert Products Corporation, 25, Lafayette Street, Brooklyn, N.Y., U.S.A., are marketing an ingenious carboy drainer which consisits of an air vent cuff with inverted spout, which fits all standard carboys. Manufacturers interested should communicate with the above firm.

Sordoviso, Ltd., The Vale, Golders Green, N.W.11, the well-known time-switch firm, have several lines of interest to moulders wishing to put production on a more automatic basis.

Ethyl Cellulose

We have just received a booklet from Hercules Powder Company, Incorp., of Wilmington, Delaware, dealing with ethyl cellulose, which is now being used in this country for injection moulding.

Ethyl cellulose is a cellulose ether made by the reaction of ethyl chloride upon alkali cellulose. It is furnished as a white granular product. It is a material which has possibilities for use in films, quick-drying varnishes, very flexible lacquers, plastics, and in similarly related fields. As in the case of other cellulose derivatives, its properties depend upon the degree of substitution, but the usual commercial product which contains about 2.4 ethoxy groups per glucose residue is the most useful. It is soluble in a wide range of cheap solvents, and forms tough films. In the plastics field it is quite useful, softening at temperatures slightly over 100 degrees C. It has excellent chemical resistance to alkalis and is likewise quite resistant to decomposition by weak or dilute acids. It offers remarkable resistance to discoloration, comparing quite favourably with cellulose acetate in this respect.

The booklet contains specific data compiled on an ethyl cellulose containing 2.4 to 2.5 ethoxy groups per glucose residue.

The material melts at about 200-210 degrees C., but becomes plastic at much lower temperatures. It can be worked on the rolls at about 110-120 degrees C. This may be compared with cellulose acetate which starts to soften at 190-200 degrees C.

Ethyl cellulose has a density of 1.14 at 25 degrees C., compared to 1.37 for cellulose acetate and 1.65 for nitrocellulose. Thus, 1 lb. of ethyl cellulose will cover as much surface as 1.20 lb. of cellulose acetate, or as much as 1.45 lb. of nitrocellulose with the same film thickness. The low density of ethyl cellulose is of like advantage in plastics, varnishes, artificial silk, and in other applications.

New Dust Collectors

The Buell Combustion Co., Ltd., have recently issued a brochure describing the operation and economic possibilities of the van Tongeren dust collector. In this publication it is said that M. van Tongeren carried out no fewer than 12,000 separate tests on models during recent years. As a result of this work, seven types of dust collectors have been evolved to meet varying conditions.

It is claimed that the most efficient type of dust collector has an efficiency of 80 per cent. for dust with particle size above 6 microns and of a specific gravity of 2.0. An example of the operating data for these dust collectors is a boiler plant with a steam load of 74,800 lb. per hour. The collector had to deal with 3,107,000 cubic ft. per hour; the dust content of the raw gas was 1.05 grains per cubic ft., and that of the clean gas 0.2468 grain per cubic ft.

G.V.D. Illuminations, Ltd., Aldwych House, London, W.C.2, have just published a most useful booklet dealing with industrial lighting systems which should prove of considerable interest to moulders. The firm specializes in individualized lighting, and their expert, Mr. G. V. Downer, is available for consultations.

The B.A. Holland Engineering Co., Ltd., have sent us a folder H.177 giving brief particulars and illustrations of the Holland S.L.M. rotary compressors, vacuum pumps, low-pressure blowers and exhausters, with an indication of their special advantages. Photographs of typical installations are included.

New Type of Industrial Respirator.

The Department of Scientific and Industrial Research has developed a new and improved form of respirator which is exhibited at the Home Office Industrial Museum, Horseferry Road, Westminster, and is expected to be widely adopted in industry. The apparatus is of simple design and comfortable to breathe through. It consists of a simple rubber mask which fits closely around the nose and lower parts of the face, with a filter pad on each side. The pads are 5 ins. by 3 ins., oval in shape, giving about five times the filtering areas of previous designs. As the pads are used up they can be unfastened from the mask and discarded. In an alternative design, the filter pads are fitted into two circular perforated boxes. In this case, however, there is a tendency for the absorbent material to be gradually used, and this design is not regarded as so satisfactory as the one first described.

"Practical Methods for Depreciation of Factory Equipment," by F. W. Gordon, published by Arthur H. Stockwell, Ltd., 3s. 6d., is a new book of interest to works engineers in moulding plants. The book describes very ably a system for the registration of industrial equipment in a standard and practical form to meet the requirements of modern works costs accounting. As the capital representation of factory equipment is usually a considerable percentage of the total assets, it is important that proper provision should be made to account for any wastage or deterioration of these assets.

Polishing Plastics

Considerable progress has been made in recent years in the finishing of fabricated work, and a recent American patent, U.S.P. 2,062,671, 1.12.36, describes a very promising method.

Abrasive compounds for polishing moulded articles by tumbling comprise a granular fibrous base, consisting of wood or cork, impregnated by and coated with an oily material, such as degras or mineral lubricating oil, and a powdered abrasive bonded to the base by a suitable vehicle, pumice, tripoli powder and calcium carbonate being the most suitable. The slightly oily film left by this treatment can be removed by further tumbling the articles with a polishing cream.

The Goodyear Rubber Co., Ltd., U.S.A., present "Pliolite," a new material suitable for a large number of important industrial purposes. In the manufacture of protective paints it is likely to serve a vital purpose, as it is highly resistant to acids, alkalis, fresh and salt water, fumes, fungus and humidity. For moisture and vapour-proof coatings and solutions it is widely recommended as it is extremely moisture-vapour-proof with low solids deposits. Heat sealing takes place at 170 degrees F. to 350 degrees F. "Pliolite" has a chemical consistency of approximately 95 per cent. rubber hydrocarbon and is not a chlorinated product.

The Paper Testing Committee's Report contains information of considerable interest to the plastic industry as paper is now extensively used in the manufacture of micarta.

According to the Bulletin of the Institute of Paper Chemistry, June issue, paper tests can be used (a) for mill control, (b) for purposes of specification where every possible variable factor has to be carefully defined, and (c) for research purposes where special care has to be taken that the test sufficiently resembles practice. A test method may be worked out for one purpose and be unsuitable for others, so that some form of compromise may become necessary. This compromise may take the form of very exact specifications which can be relaxed when highly critical results are not necessary, or an intermediate specification can be made which combines the most generally useful measure of rapidity, accuracy and utility. The specifications embodied in the report tend to fall in the latter case. The Committee (devoted to Paper Testing Methods) has considered the most widely used tests in the first place, and a questionnaire was circulated to members of the British Association, and this formed the basis for the tests described in the report.

PATENTS RELATING TO PLASTICS

These abridgments of recently published specifications are specially compiled for this Journal by permission of the Controller of His Majesty's Stationery Office. Group abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet, as issued, on payment of 5s. per group volume, or in bound volumes, price 2s. each, and the full specifications can be obtained from the same address, price 1s. each.

482,539. Synthetic Resins

TENNANT, W. J. (Crown Cork and Seal Co., Inc.) February 1, 1937.

A cork composition having substantially the unimpaired properties of cork itself comprises cork granules and a binder of bodied tung oil and glue, the quantity of binder being only that sufficient to cement the cork granules together. The term glue includes gelatine, albumen, and casein. The tung oil is bodied by being heated in an open kettle to 450-500 degrees F. for about an hour when the oil is in such a state that when a rod is dipped therein and raised a string is formed. The heated oil is mixed with a softening agent for cork, such as glycerine, glue and a hardening agent, e.g., formaldehyde, para-formaldehyde or hexamethylenetetramine, is added and the cork granules are coated with this binder and moulded to shape. Suitable proportions are 4 lb. of glycerine, 1 lb. of bodied tung oil and 1 lb. of glue. Glyco or sulphonated castor oil may replace the glycerine when the cork composition is not to be used for beverages. Synthetic resins, e.g., phenol-formaldehyde, urea-formaldehyde, cumarone or alkyd resins, natural resins, e.g., copals or dammars, or mixture of resins may be added to the binder, and also waxes. Suitable proportions are 2 lb. of tung-oil-glue-glycerine mixture, 1 lb. of phenol-formaldehyde resin and 4 oz. of hexamethylenetetramine. Three pounds of the binder are used to coat 12 lb. to 13 lb. of cork granules.

482,640. Wall-boards

DEHN, F. B. (Plastergon Wall Board Co.) May 24, 1937.

A wall-board is provided with stiffened zones, e.g., two opposite or all four edge portions or the corner portions, formed by impregnating these zones with a material such as starch or a thermo-hardening resin. The zones may be impregnated by dipping or spraying.

482,943. Phenol-aldehyde Resins

BAKELITE, LTD. September 5, 1936.

A phenol-aldehyde resin capable of being moulded without fillers is produced from a hardenable and fusible resin, e.g., a novolak mixed with a hardening-agent, or a resol, free from water resulting from the condensation reaction, by adding thereto a small quantity, e.g., 1—5 per cent., of aniline hydrochloride and sufficient water, e.g., 10—30 per cent., to moisten the resin, and subjecting the moistened resin to a controlled mixing and heat treatment until the resin, while still completely soluble in ethyl alcohol and acetone, is no longer fusible, but is still plastic. Resins suitable for the invention are novolaks mixed with hexamethylenetetramine or methyleneaniline; partially acetylated novolaks with hardening-agents; condensation products of phenols, aldehydes and drying oils or fatty oils.

482,700. Porous Structures from Viscose

VISCOSE DEVELOPMENT CO., LTD., and FLETCHER, G.A. September 28, 1937.

Particles of a metal which reacts with caustic soda with evolution of hydrogen are mixed with a solution of viscose so as to form a porous mass which on coagulation and regeneration forms a solid porous structure. Coagulation may be effected by allowing the viscose to stand for some time, or by heating. The process of coagulation is assisted by the heat evolved in the reaction of the metal with caustic soda, and by removal of caustic soda during the reaction. The coagulated viscose is treated with acid to regenerate the cellulose and is then washed.

482,836. Vinyl Polymerization Products; Moulding Plastic Materials

ROHM AND HAAS AKT.-GES. October 5, 1936.

Raw shaped or moulded articles consisting essentially of one or more polyvinyl compounds are coated on one or more surfaces with a thin coating (such as produced by dipping or painting) comprising one or more mohomeric or partially polymerized vinyl compounds and the applied coating is polymerized in contact with a mould or plate.

428,701. Vinyl Polymerization Products; Coating Surfaces

BRITISH THOMSON-HOUSTON CO., LTD. October 4, 1937.

A vesicular electrical insulating substance is produced by heating polymethacrylic acid above its boiling point so that part of the polymerizate vaporizes and becomes trapped in the remainder. The heating may be effected in moulds so that a shaped article is produced. Coatings of the vesicular substance may be produced on a surface, e.g., a copper wire or a brass mandrel, by depositing the polymerizate on the surface and then heating above the vaporization temperature; the polymerizate may be applied to the surface either directly or in a solvent, e.g., toluol, which vaporizes at a lower temperature than the polymerizate.

483,496. Treating Fibres with Rubber

RUBBER PRODUCERS RESEARCH ASSOCIATION, WOOL INDUSTRIES RESEARCH ASSOCIATION, WILSDON, B. H., and BLOW, C. M. October 22, 1936.

Rubber is deposited from aqueous dispersions on to textile fibres, e.g., of natural or artificial cellulose, silk or wool, by pretreating the fibres with an aqueous solution of a cationic soap compound which gives a positive ion comprising a long-chain aliphatic residue and subsequently immersing the fibres in the aqueous rubber dispersion. The cationic soap compounds comprise quaternary ammonium, phosphonium or sulphonium compounds containing an aliphatic residue of 8 or more carbon atoms such as cetyl pyridinium bromide, cetyl-trimethyl-ammonium chloride or bromide and cetyl-dimethyl-sulphonium methyl sulphate. The treatment may be applied to loose fibres at any stage during manufacture into yarn, fabric or felt. Felts may be made by treating carded webs. Yarn may be treated in hank form. The fibres may be wetted with a dilute sodium carbonate solution prior to immersion in the rubber latex. Oils, fats, waxes, and colouring matter may be added.

482,170. Compound Glass

TUDOR SAFETY GLASS CO., LTD., PUGH, C. T., and ASH, W. November 26, 1937.

Compound glass comprises two glass sheets united to an interlayer comprising three layers of cellulose acetate of which the outer two contain about 50 per cent. and the inner about 18 per cent. of a plasticizer such as triacetin, tricresyl phosphate, or dibutyl phthalate. The three layers laid loosely between the glass sheets are immersed in a mixture of ethyl lactate and triacetin, mangled to give preliminary adhesion, and united by heat and pressure.

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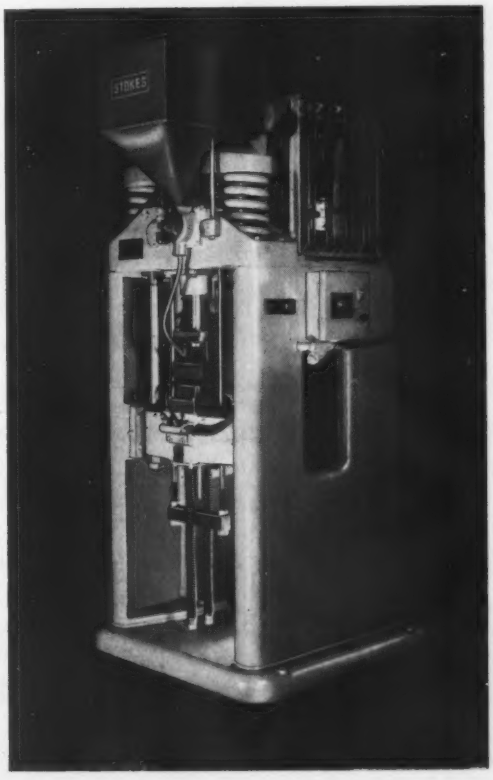

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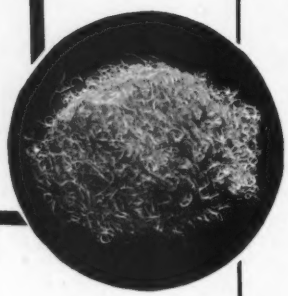

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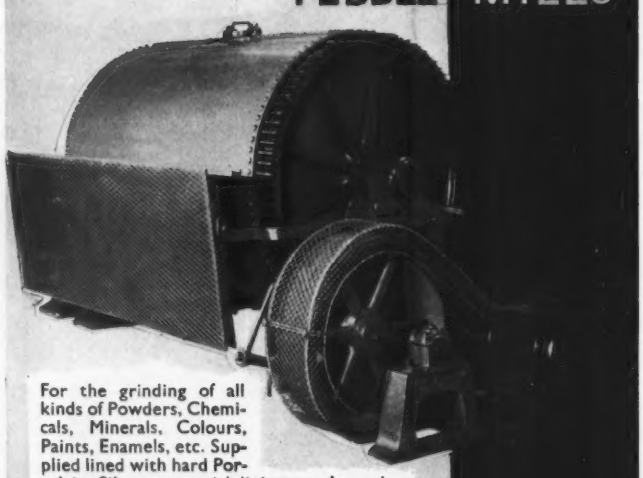

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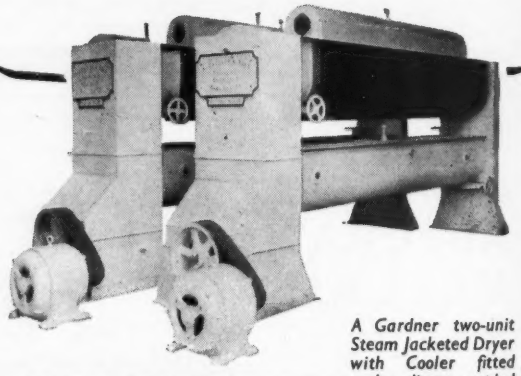

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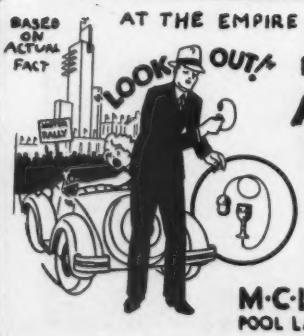

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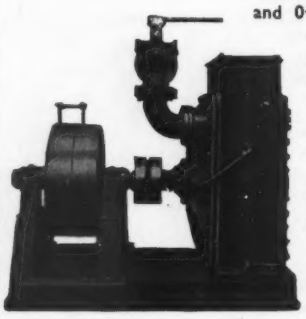

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